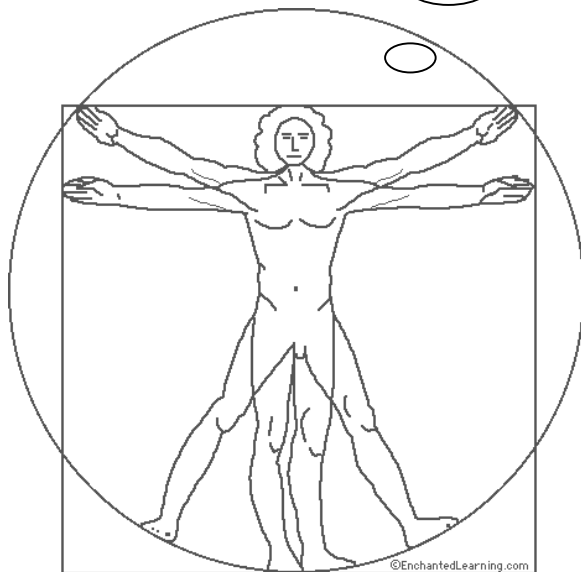


# Staying alive



Teachers  
support  
material

Department of Science  
IES Ramon Casas i Carbó  
3r ESO

This material has been elaborated by Rosa M. López Casas, a teacher in the Department of Science of the IES Ramon Casas i Carbó (Palau-solità i Plegamans), as her project for paid study leave (C modality) which took place in Scotland in the school year 2005-2006\*.

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\* Resolució EDC/1011/2005, de 6 d'abril, DOGC 4364 de 15 d'abril de 2005

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## Unit 0. What is it all about?

This teacher support material is divided in the same units as the pupil's textbook called "Staying alive". In every unit teachers will find, first, the answers to the activities in the pupil's textbook followed by several extra activities.

There are more activities than time to put them into practice. So teachers have to choose which ones they are going to use. The aim of those activities is to give teachers different ideas on how to recap everything learnt by pupils and let them try those ones more suitable for their pupils.

Some of these extra activities are laboratory activities. It is not always necessary to go to the lab to do them but they are planned with small groups of pupils in mind.

Complementary to this teacher support "book" there is an annex book where teachers can find all the drawings, diagrams, lab protocols, etc. needed to do the extra activities and lab activities. So teachers just have to look through the activities, find the one they are interested in and go to the annex in order to find a copy ready to be photocopied and given to pupils.

Finally a collection of power point presentations is also available in order to help to start a new unit or recap or understand a lab activity. Power point presentations can be found on the CD. Their title indicates the unit where they may be used but they are mentioned, when necessary, all through this teacher support material.

Here is the list of all power point presentations and a short description of their contents:

✓ **Unit 1. Life's building blocks**

- All living things are made up of cells
- 2 kinds of cells: Prokaryote & Eukaryote
- Differences between plant & animal cells
- Structures of the cell and their functions
- Mitosis

✓ **Unit 2. Processing food.**

- 5 reasons we need food
- The human digestive system
- Digestion and enzymes
- Absorption through villi
- Amylase lab activity

- ✓ **Unit 2. Breathing system (structure and function).**
  - Position of lungs
  - Parts of the breathing system
  - Gas exchange inside alveoli
  - How breathing in and breathing out works
- ✓ **Unit 2. Circulatory system (blood vessels).**
  - 3 types of blood vessels (arteries, veins and capillaries)
  - Main characteristics of blood vessels
- ✓ **Unit 2. Take your pulse rate.**
  - The pulse rate and how to take it
  - Instructions about the lab practice
  - Factors that can alter the pulse
  - How to be fitter
- ✓ **Unit 2. All about blood pressure**
  - Definition of blood pressure
  - Reasons for changes in blood pressure
  - How to measure blood pressure (lab practice step by step)
  - Problems of high blood pressure
  - Problems of low blood pressure
- ✓ **Unit 2. Heart structure and Heart sounds**
  - Main anatomy of the heart
  - Heart sounds
  - Valves responsible of sounds
  - Systole & diastole
- ✓ **Unit 2. Heart dissection**
  - Parts of the heart (with an exercise)
  - How to dissect a heart, step by step
- ✓ **Unit 2. Kidneys**
  - Water balance
  - The role of ADH in kidneys water balance
  - How kidneys work
  - Parts of kidneys

✓ **Unit 3. Test your reaction time**

- How to do different test activities through internet step by step
- Part of a lab activity in unit 3

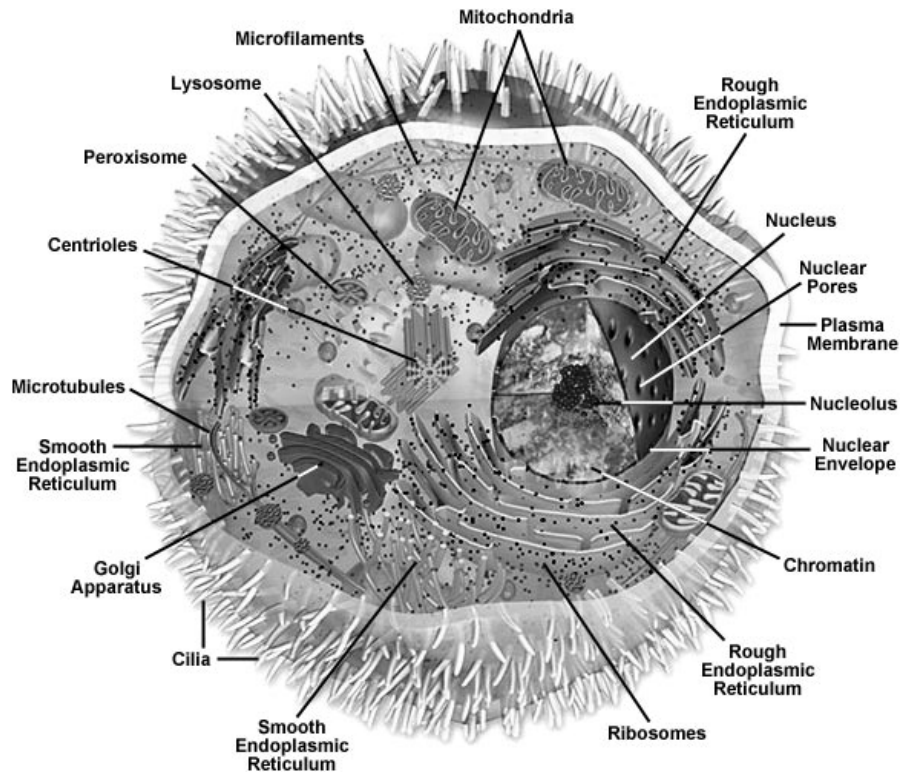
✓ **Internet activities**

- Web pages where students can check their knowledge about different subjects learnt throughout the course.





# Unit 1. Life's building blocks



"Where a cell exists, there must have been a pre-existing cell, just as the animal arises only from an animal and a plant only from a plant." "Omnis cellula e cellula" or "All cells from cells." - Rudolf Virchow (1855).

WALT: What am I learning today?

By the end of this unit I will know:

- What a cell is
- Living beings are made up of cells
- The cell theory premises
- The structure of cells
- Levels of organization
- How a microscope works

All organisms are made up of cells - a cell is the simplest collection of matter that can live. Most cells are very small, so we need to use a microscope to see them.

Each cell can live alone, doing everything it needs, or it can live together with other cells by forming many-celled organisms like humans, other animals, and plants.

Our bodies consist of more than a billion cells, with each type of cell having its own special function. All the different cells communicate and cooperate with each other to accomplish all the functions that our bodies need. In contrast, there are organisms called protists that are single-celled organisms and carry out all the different functions that are needed to live.



**Activities from pupil's textbook****Activity 1. Cell theory. Historical time line activity**

(Page 8 in student's book)

Students understand the structure and function of cells and organisms.

**AIM:**

To evaluate evidence to support cell theory.

To use reference sources to obtain information.

To construct a chart (timeline).



Students research historical events leading to the development of the cell theory. Research should include contributions made by the following people/scientists -Robert Hooke, Hans and Zacharias Janssen, Anton van Leeuwenhoek, Matthias Schleiden, Theodor Schwann, Rudolph Virchow, etc. and dates of their contributions.

Students report on their findings by constructing a timeline showing the chronology of the historical events leading to the development of the cell theory.

**Materials** for each student or pair of students:

Reference materials (teacher hands out information (pages i & ii & iii in the annex) & if possible other texts, encyclopaedias, Internet,...)

Rulers, paper, coloured pencils or markers.

**Procedure:**

- Research the following people: List some of their contributions to science and dates of these contributions.-

Robert Hooke-

Matthias Schleiden

Hans and Zacharias Janssen

Theodor Schwann

Anton van Leeuwenhoek-

Rudolph Virchow.

- Draw a timeline showing the chronological order of these scientists and their contributions.
- Label the timeline with dates of the above scientists' discoveries.
- The earliest date should be on the left of the timeline and the most recent date on the right.
- Label each date with the corresponding scientist's name and contribution(s) in an organized and legible manner.
- Be sure your spacing shows a reasonable approximation of the amount of time elapsed between dates.

**Questions:**

1. What theory did these scientists provide evidence for?

\*the cell theory

2. What instrument was necessary before the cell theory could be developed?

\*The microscope

3. Which three scientists directly contributed evidence for the cell theory?

\*Matthias Schleiden, Theodor Schwann, Rudolph Virchow

4. How did the earlier scientists and their contributions directly affect the discoveries of later scientists (see #2)? For example, what had to come first?

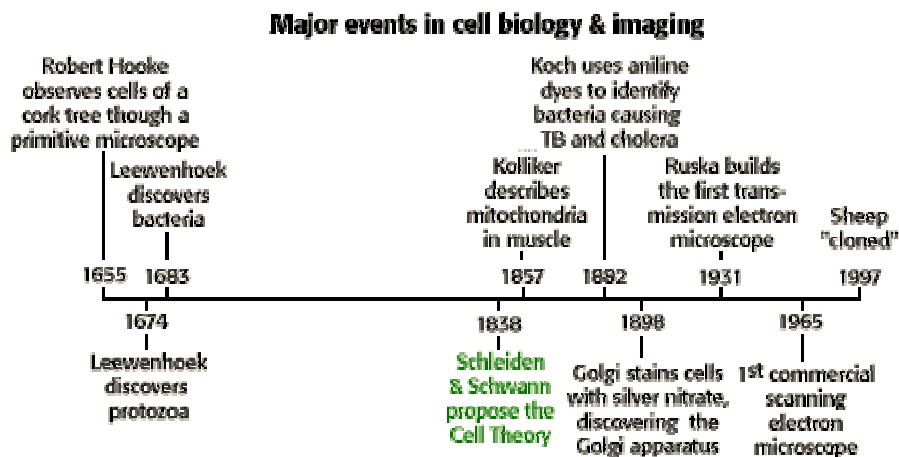
\*Hans and Zacharias Janssen had to first develop the microscope before cells could be discovered. Robert Hooke then discovered empty, dead cork cells in tree bark. Anton van Leeuwenhoek discovered the existence of living cells and is sometimes given credit for the microscope.

5. List the three parts of the cell theory.

\*All living things are made of cells.

\*Cells are the basic units of structure and function in living things.

\*Living cells only come from other living cells



**Activity 2. The structure of the cell**

(Page 10 in student's book)

The complete sentences are:

1. Humans are multicellular beings
2. Eukaryotic cells are cells which have a nucleus
3. Prokaryotic cells are cells which have no nucleus
4. Human cells are eukaryotic cells
5. The three main parts of a eukaryotic cell are: cell membrane , nucleus and cytoplasm

**ACTIVITY 3. Differences between animal and plant cells**

(Page 15 in student's book)

**AIM:** To recap the differences between animal and plant cells.

**Procedure:** Students will draw a table similar to the table shown below. This table summarises the differences between plant and animal cells:

Structure	Typical Plant Eukaryotic Cell	Typical Animal Eukaryotic Cell
Cell Wall	Yes	No
Cell (or plasma) membrane	Yes	Yes
Centrosome	No	Yes
Chromosomes	Many	Many
Chloroplasts (plastids)	Yes (many)	No
Cilia or Flagella	Some present	Yes, complex
Cytoplasm	Yes	Yes
Endoplasmic reticulum	Yes (some exceptions)	Yes (some exceptions)
Golgi apparatus or Golgi body	Yes	Yes
Lysosomes	No	Common
Mitochondria	Yes	Yes
Nucleus	Yes	Yes
Ribosomes	Yes	Yes
Vacuole	Yes, one and big	Yes, but smaller

Then answer these questions:

1. What cell parts do animal cells have that plant cells do not have?

*Animal cells have centrosome, but plant cells do not*

2. What cell parts do plant cells have that animal cells do not have?

*Plant cells have a cell wall and chloroplasts, but animal cells do not*

3. Why do plant cells have cell walls and animal cells do not?

*The cell wall provides the plant cells with mechanical protection and gives rigidity. Animal cells do not need it as they have got skeletons*

4. Why do you think plant cells have bigger vacuoles than animal cells?

*Plant cells have bigger vacuoles because they have to store more nutrients as plant cells cannot move to find nutrients*

#### ACTIVITY 4. Is it a plant cell or is it an animal cell?

(page 16 in student's book)

**AIM:** To recap the most important differences between animal cells and plant cells.

**Procedure:** Students draw, by copying, animal cell and plant cell images from a microscope and then make four sentences that recap the main differences between plant cells and animal cells by joining the two parts of the sentences. Here are the correct complete sentences.

1. *Plant cells have a cell wall, but animal cells do not.*
2. *Plant cells have chloroplasts, but animal cells do not.*
3. *Plant cells generally have a more rectangular shape because the cell wall is more rigid, but animal cells have a round or irregular shape because they do not have a cell wall.*
4. *Plants cells usually have one or more large vacuole(s), while animal cells have smaller vacuoles, if any are present.*

This activity can be extended with an extra activity in which students distinguish between animal and plant cell images taken from a microscope.

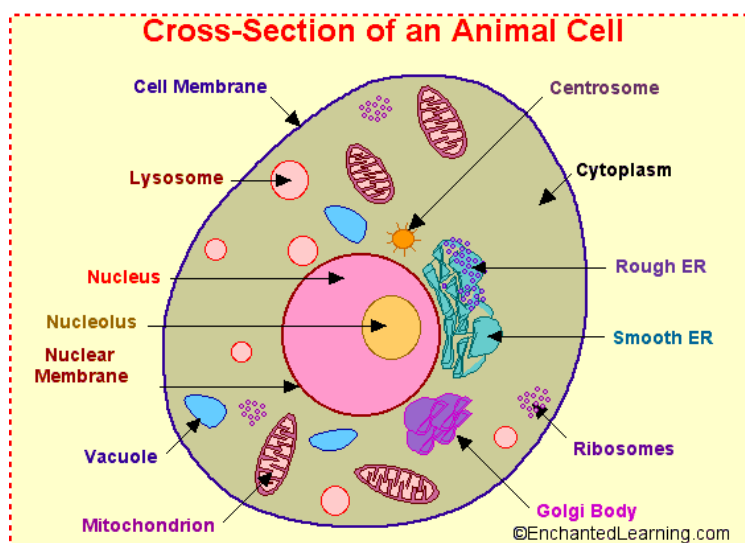
Page iv of the annex (unit 1) shows microscope images of cells (animal and plant) and following there is a student answer sheet.

Teachers, use the photographs either to show your class, or print it for student use. Give every two students a copy of the pictures and ask them to practise drawing them on the sheet provided. At the same time they decide if it is an animal or a plant cell and explain why.

The answer sheet (page v on the annex) can be also used in the laboratory.

#### ACTIVITY 5. Drawing a cell

(Page 16 in student's book)



**AIM:** To help students remember all parts of the cell.

Here is an example of an Animal Cell drawing, there are more possibilities. Teacher may wish to ask less-able pupils copy it.

**ACTIVITY 6. Cell organelle table**

(page 17 in student's book)

**AIM:** To recap the functions and names of cell organelles.

Procedure: Students draw a table similar to the table shown below. This table summarizes the functions of all the cell organelle.

ORGANELLE What's my name?	LOCATION Plant or animal or both?	DESCRIPTION What am I like?	FUNCTION What do I do?
Cell wall	plant, not animal	*stiff and rigid, *made up of cellulose	*supports the cell (grow tall) *protection
Cell membrane	both plant/animal	*plant - inside cell wall *animal - cholesterol	*support *protection *controls movement of materials in/out of cell
Chloroplasts	plant, not animal	*green, oval usually containing chlorophyll (green pigment)	*uses energy from sun to make food for the plant (photosynthesis)
Nucleus	both plant/animal	Large, normally spherical structure containing genetic materials (DNA)	* Controls cellular activities. * Passes information from generation to generation
Cytoplasm	both plant/animal	Fluid, jelly-like material	* The site of all the chemical reactions and processes that occur in the cell
endoplasmic reticulum (E.R.)	both plant/animal	*network of tubes or membranes	*carries materials through cell *Rough E.R produces proteins *Smooth E.R. produces lipids
ribosome	both plant/animal	*small bodies free or attached to E.R.	*produces proteins
Mitochondrion	both plant/animal	*bean-shaped with inner membranes	*breaks down sugar molecules into energy $\text{Glucose} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{Energy (ATP)}$ Respiration

Vacuole	plant - few/large animal - small	*fluid-filled sacs	*stores food, water, waste (plants need to store large amounts of food)
Lysosome	plant - uncommon animal - common	*small, round, with a membrane	*breaks down larger food molecules into smaller molecules *digests old cell parts
Golgi apparatus	both plant/animal	*sacs (with a single membrane) piled up and with vesicles	*Modifies lipids and proteins. *Stores and packs materials
Centrosome	animal not plant	An area with a ring of nine groups of microtubules	*Controls the replication of the cell

### ACTIVITY 7. Animal cell mitosis

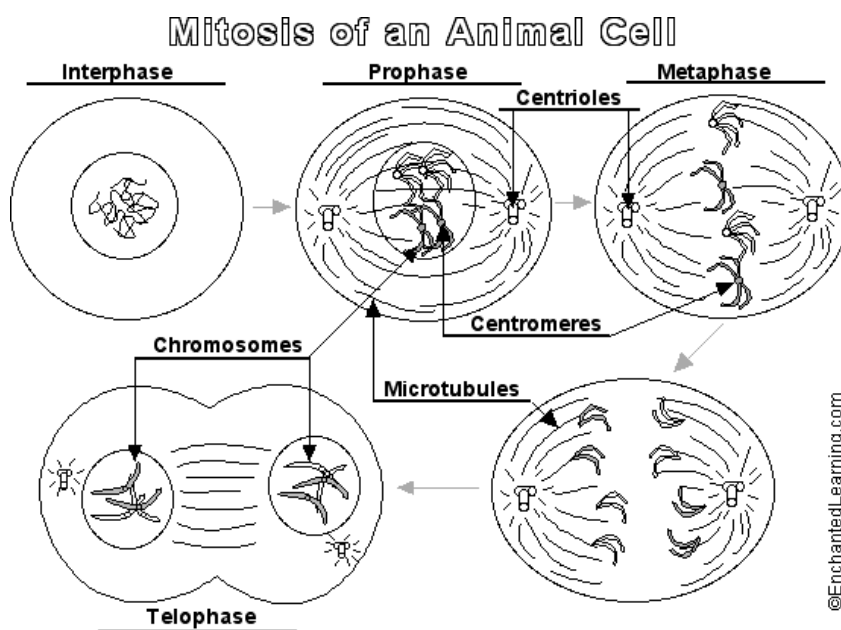
**AIM:** To help students recognize all parts of animal mitosis.

(page 20 in student's book)

**Procedure:** Teacher gives a diagram to every student showing all the parts of the animal mitosis. Students will have to glue it in their jotter and label it correctly.

A copy of the student diagram is found on page vi of the annex (unit 1).

Here is the solution.





**ACTIVITY 8. About cells**

(page 20 in pupil's textbook)

**AIM:** To recap some of the last new concepts.

**Procedure:** Students write down in their jotter the complete sentences:

1. Human cells are **heterotrophic** because they need to take nutrients from other beings
2. All the chemical reactions that take place in a cell are called metabolism
3. **Catabolism** is all the chemical reactions that destroy molecules in order to obtain energy
4. **Anabolism** is all the chemical reactions that build up complex organic molecules from small ones
5. Some cells can move in different ways, three of these are: amoeboid movement, vibrate movement and contractile movement
6. A cell can perform three functions: nutrition, relation and reproduction.

**ACTIVITY 9. About mitosis**

(Page 20 in student's book)

**AIM:** To recap Mitosis phases.

**Procedure:** Students write down in their jotter a table to summarise all the phases of mitosis. It needs 2 columns and 5 rows. Then they fill it in with the appropriate sentences from a list. The first two sentences are already done for them.

They will have a table similar to this one:

Mitosis phases	Events at these phase
Prophase	The chromosomes start to condense strands. They are made of two chromatides. The nuclear membrane disappears.
Metaphase	The chromosomes line up along the equator Spindle fibres attach to the centromeres of the chromosomes.
Anaphase	The pairs of identical chromatids are pulled apart and move to the opposite poles.
Telophase	The cytoplasm divides. The nuclear membrane reappears. Two daughter cells are formed. Each has the same number of chromosomes and is identical to the parent cell.

### ACTIVITY 10. Levels of organization.

(Page 22 in student's book)

**AIM:** To write complete sentences to recap levels of organization.

**Procedure:** Students write down in their jotter the complete sentences. The sentences that students write are:

*An organ is made up of various different types of tissues which work in coordination.*

*The organs are grouped together to form systems and apparatus.*

*A system is a set of organs that act in coordination in order to perform a complex function*

*All the cells in an animal make up the level of cellular organization.*

*A tissue is a group of cells of the same type that perform the same function.*

### Let's look at what we've learnt

(page 24 in pupil's textbook)

Here are the full sentences (words in black are the missing words in the student's copy).

All living beings are composed of one or more **cells**, which are the basic units of life.

Plant and animal cells have a nucleus, **cytoplasm** and **organelles**.

Only plant cells have a **cell wall**, and a large permanent **vacuole**. Green plants also have **chloroplast**.

Animal cells have **centrosome** but plant cells do not.

Proteins are made in **ribosomes**.

Respiration takes place in the **mitochondrion**.

The general reaction for respiration is:



When a cell can reproduce and give two new cells with the same genetic information, this is called **mitosis**.

Mitosis phases are: prophase, **metaphase**, anaphase and **telophase**.

All cell activities are controlled by the **nucleus**, which contains **DNA or Chromosomes**.

All the chemical reactions that take place in cells are called **metabolism**.

The correct order of levels of organisation is: Cells, **tissues**, **organs**, **systems** and organisms.

If you are looking at any tissue under the **microscope** you must make sure the tissue is very thin so the light can shine through it.

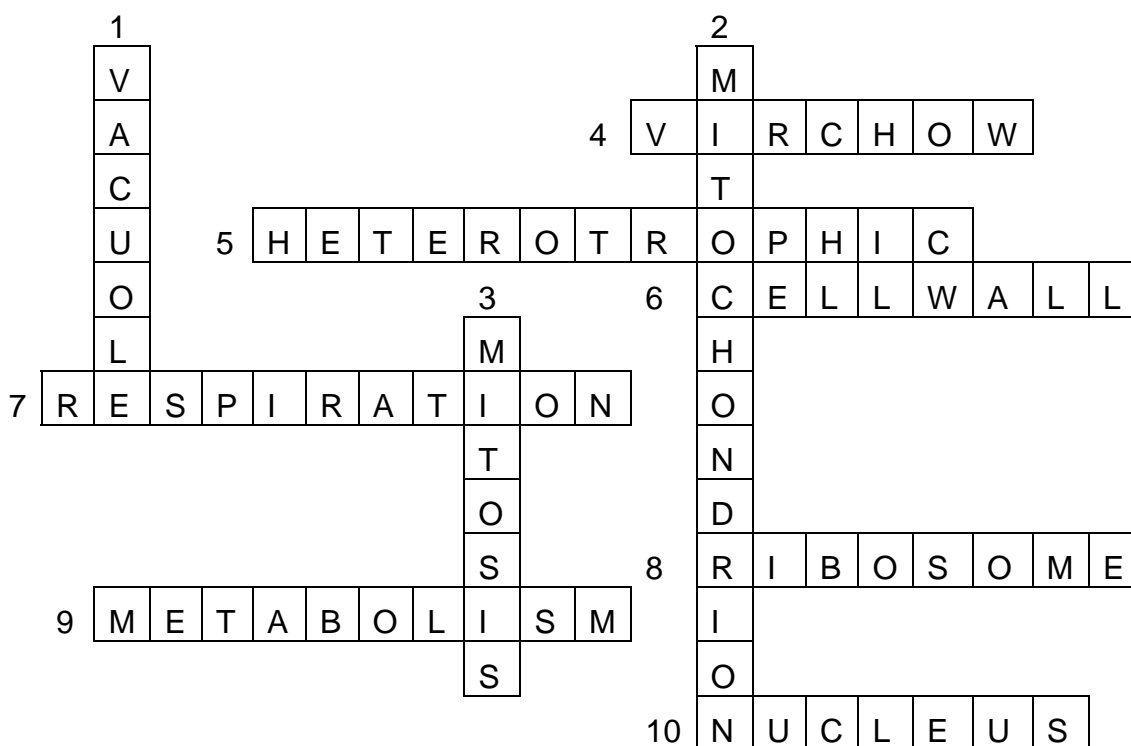
From now on you'll find laboratory activities and extra activities to be used with students in order to consolidate their knowledge about this unit. There are no references to all these activities in the pupil's textbook.

### Extra activities

From now on you'll find extra activities than can be used to recap everything done in this first chapter. Depending on student's level and time available every teacher can decide whether to use some, all or none of them.

### Crossword.

On pages xxiii & xxiv of the annex (unit 1) there are copies of the crossword ready to be photocopied and given to students (make sure they glue it in their jotter); here you'll find the answers.



1. Organelle. Animal's cell is small
2. Organelle. The cellular respiration takes place in it.
3. Cellular division
4. "Father" of the cell theory
5. Cells that transform organic material from other beings
6. Made up of cellulose, protects the cell.
7.  $\text{Glucose} + \text{O}_2 \longrightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{Energy (ATP)}$
8. Organelle that builds proteins
9. All the chemical reactions that take place in a cell
10. Organelle that control and regulate all cell activities.

## Introducing Cells: Quiz

**AIM:** To write complete sentences to recap the whole unit.

**Procedure:** Students write down in their jotter the complete sentences (questions and answers). This quiz is designed to be used with fast workers & more-able students (Students with a high level of English) as questions need long answers. Teachers may also choose to leave students free to answer the questions in their mother language rather than in English.

You can find the quiz, ready to be photocopied on page xxv of the annex (unit 1). Here are the answers:

1. Animal and plant cells contain a nucleus, the cell membrane and the cytoplasm
2. The 3 things that are only found in green plant cells are: the cell wall, the chloroplasts and a big vacuole.
3. You will find chloroplasts in green plant cells but not in a root cell
4. The cell wall provides the cells with mechanical protection and a chemically buffered environment
5. The jelly-like substance where chemical reactions take place is the cytoplasm.
6. The nucleus controls and regulates all cell activities
7. The cell membrane helps maintain homeostasis in the cell and also protects and supports the cell.
8. The vacuole stores food, water, and wastes materials.
9. Red blood cells transport oxygen.
10. White blood cells defend the body from intruders.
11. Iodine solutions make cells clearer under the microscope.
12. Because it is necessary to let the light shine through it.
13. The iodine solution changes from yellow to purple.
14. The cell wall is made of cellulose.
15. The hereditary substance is DNA (chromosomes)
16. DNA is found in the nucleus.
17. Cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondrion, lysosome, ribosome, endoplasmic reticulum, Golgi apparatus, centrosome, plastids, chloroplasts, cilia and flagella.

The next two activities are an alternative to the cell quiz for slower workers & less-able pupils.

### Maze.

Just photocopy the maze that can be found on page xxvi of the annex (unit 1) and ask students to find the way to the cell.

### Chopped words.

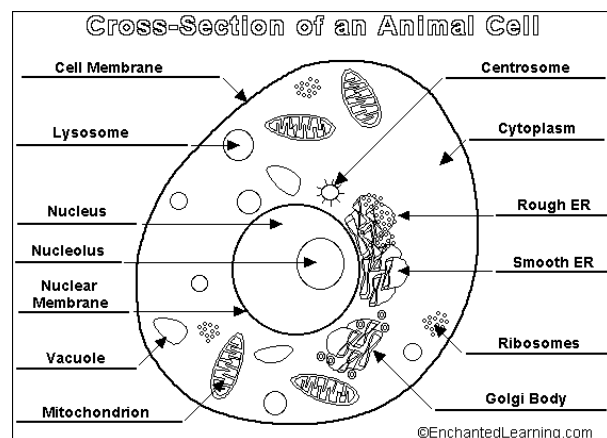
Give students a copy of the table (page xxvii of the annex-unit 1) and ask them to find the words and write them in their jotter. Here is a list with all the words:

chromosome	tissues	organs	chloroplast
vacuole	nucleus	chlorophyll	cell membrane
cell wall	cytoplasm	mitochondria	Ribosome

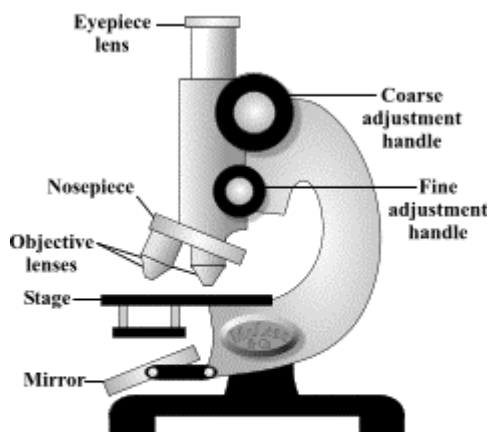
### Cell's structure.

Give each student a copy of the cell (page xxviii annex-unit 1) and ask them to label and colour it. It could be useful to make students write not only the name of the structure but also the function.

Here you'll find the answers.



### A Microscope



To find the total magnification, you multiply the magnification of the eyepiece lens, by the magnification of the objective lens you are using.  
You must also focus the microscope with the objective lens at the lowest magnification.

### Microscope parts.

Give each student a copy of the microscope image (page xxix annex-unit 1) and ask them to label and colour it (it's the same picture they have on page 19 in their textbooks).

Here you'll find the answers.

### **Mitosis phases.**

Give each student a copy of the drawings of phases of mitosis (there are several copies ready to be photocopied on page xxx of the annex-unit 1). Ask them to cut them up and put them in the right order. Then they can glue them in their jotter, writing down the name of the phase and what happens during it.

### **Mitosis summary**

Give each student a copy of the text (pages xxxi & xxxii of the annex-unit 1) where some phrases are missing, and the list of the missing phrases. Ask them to fill in the gaps and then glue it in their jotter. The whole text is shown below:

Mitosis is the process of cell division, which is used for:

- Growth
- Healing wounds
- Reproduction (babies develop from single cells)
- Replacement of old and damaged cells

Mitosis increases the number of cells. It produces two new daughter cells from the original parent cell, each one is genetically identical to the parent cell, and has exactly the same chromosome component as the parent. This makes sure the organism keeps the characteristics of its species.

The phases of mitosis are:

Prophase: DNA condenses to form chromosomes, made from a pair of chromatides. Nuclear membrane disappears.

Metaphase: Chromosomes line up at the equator (the central plane) of the cell. The spindle fibres attach to the centromere of every chromosome.

Anaphase: Pair of identical chromatides is pulled apart towards the poles (top and bottom, north and south) of the cell.

Telophase: Chromatids pulled completely to the poles. Cytoplasm divides and nuclear membrane reforms. Cell division is completed.

If the parent cell started off with 46 chromosomes like a human one, then the 2 new daughter cells will each have 46 too!!

**Key Words for Mitosis**

Give every student a copy of the mitosis vocabulary and of the explanations. They have to match both of them and then glue them in their jotter.

Here are the answers (sentences and mitosis vocabulary ready for photocopy can be found on page xxxiii of the annex-unit 1).

Cell cycle:	Stages in the life of a cell.
Chromatid:	One half of a chromosome.
Centromere:	Structure that holds 2 chromatids together.
Chromosomes:	Condensed DNA, which can be seen when the cell is dividing by mitosis.
Daughter cells:	The 2 new cells produced by mitosis.
Mitosis:	Programmed cell division, which produces 2 new cells. Each of these cells has exactly the same number of chromosomes as the parent cell.
Spindle fibre:	These are attached to the centromeres of chromosomes during mitosis. They pull the chromosomes apart into 2 chromatids.

**Cells: Glossary**

Give every student a copy of the cell vocabulary and of the explanations. They have to match both of them and then glue them in their jotter.

Here are the answers (sentences and cell vocabulary ready for photocopy can be found on page xxxiv of the annex-unit 1).

Cell wall:	Surrounds plant cells. It is made of cellulose, helps store water, and supports the plant.
Cells:	The basic building blocks of all living things.
Cellulose:	Structural carbohydrate found in plant cell walls.
Chloroplast:	Found in green plants, it contains the green pigment chlorophyll. Photosynthesis occurs in them.
Cytoplasm:	Jelly-like substance where chemical reactions take place.
DNA:	Contained in the nucleus of a cell, it controls everything the cell does, how it works, and what the final plant or person looks like.
Membrane:	Controls entry and exit of substances, e.g. solutes and gases, in to and out of the cell.
Microscope:	An apparatus which makes small objects seem larger.
Nucleus:	Controls the functions of the cell; contains DNA.
Organ:	Large group of tissues, which work together.
Stain:	Makes it easier to see the cell's structures.
Tissue:	Large group of similar cells joined together.
Vacuole:	Cavity in plant cells which stores water, minerals and sugars.

## Chromosomes summary

This is an advanced activity for students with a high level of English (fast workers & more-able pupils).

**Procedure:** Give every student a copy of the text with some blanks (page xxxv of the annex-unit 1) and ask them to complete it with words from the box. Once finished, teachers may also make pupils translate the text into their mother tongue (fast workers & more-able pupils).

Here is the text with the correct words underlined:

A chimpanzee and a tobacco plant each have 24 pairs of chromosomes. So, the number of chromosomes is not responsible for making them different.

The thing that makes the difference is the information carried in the chromosomes. Each pair of chromosomes carries information in the form of a code. Each piece of information is called a gene and the coded information is the right one for every individual plant or animal.

For example the genes which make us human are different from the genes that make a privet hedge although both have 23 pairs of chromosomes.

It is important that the number of chromosomes stays the same every time a cell divides. If they didn't, the cell being copied would not be the same as the original cell. The number of chromosomes is responsible for the number of genes in all cells and the coded information must remain the same. For example if cells in your pancreas lost a chromosome it might be the chromosome that contained the insulin gene, so you would then get diabetes.

In some human pregnancies the cell division goes wrong and the number of chromosomes is 47 (23 pairs + an extra one) and not the 46 which we should have. The babies are then born with Down's syndrome. Babies like this show some mental and physical problems.

## No doubts!

On pages xxxvi & xxxvii of the annex (unit 1) there is a wee multiple choice test to make pupils auto evaluate their knowledge.

Here are the answers to the questions in the "no doubts!" test.

1 B	3 C	5 D	7 B	9 D	11 A	13 A	15 C
2 A	4 A	6 B	8 B	10 B	12 D	14 B	

## Unit 1 Life's building blocks

This is a power point presentation which contains the most important concepts of unit 1. It can be shown to pupils either at the beginning (to show what the unit will be about) or at the end (to sum up) of this unit.



***Laboratory activities***

**AIM:** To learn practical skills about handling a microscope.

There are different laboratory activities to be done with students; here you'll find some of them.

**Lab practice 1. Introduction to the Microscope****AIMS:**

To learn the parts of the microscope and their functions

To understand how to calculate magnification and field of vision

To practise the correct way to use the microscope

There are different ways to find out about a microscope, here are some of them.

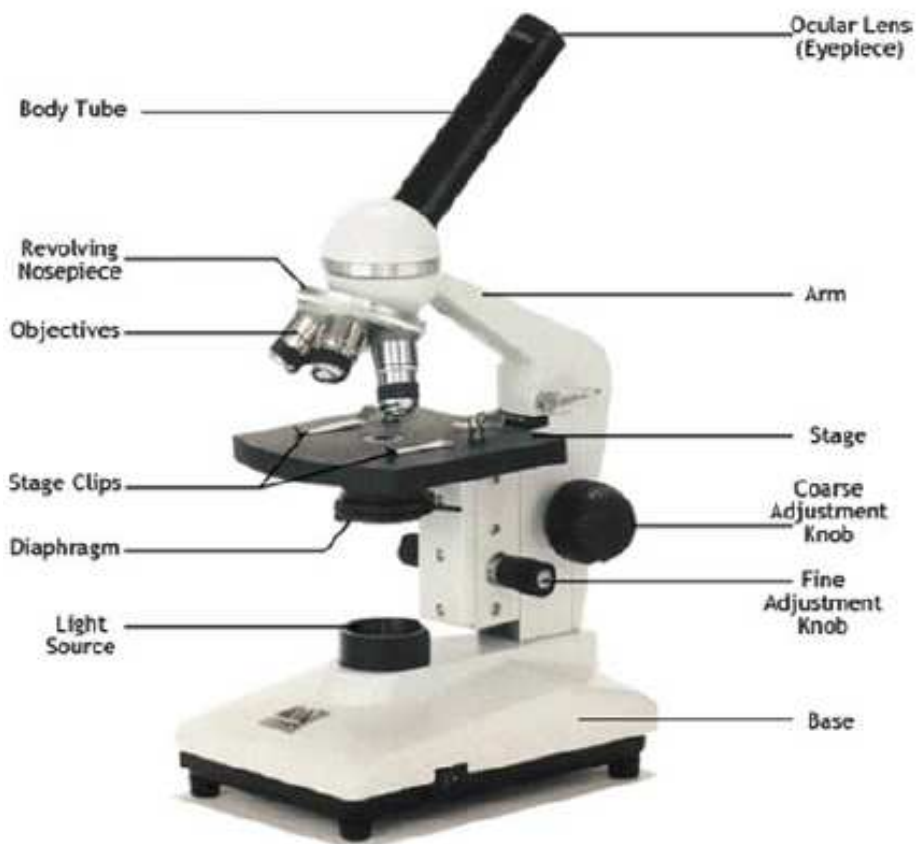
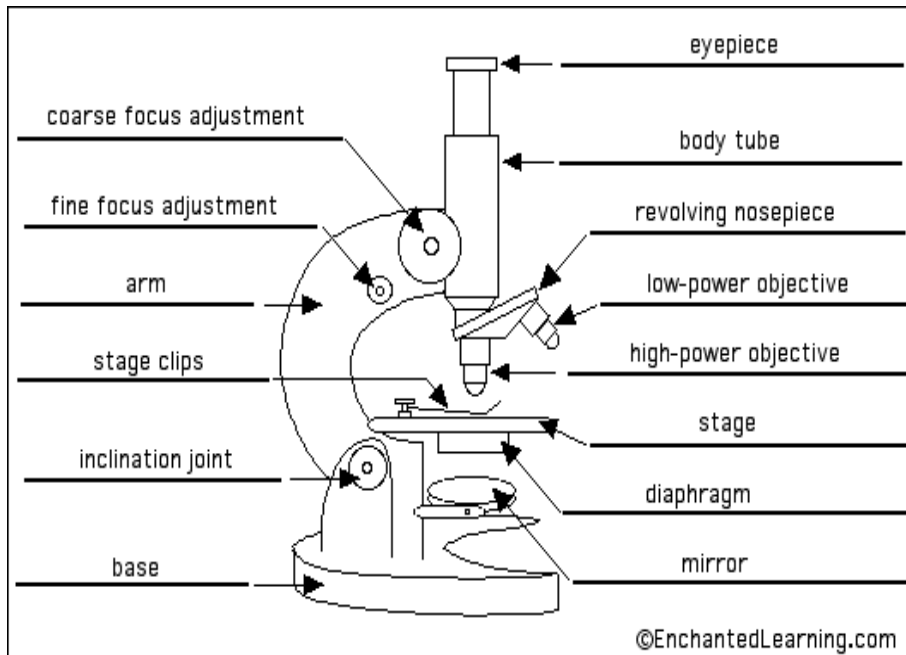
**Lab practice 1.1. Microscope parts.****Microscope parts**

**Procedure:** Give each pair of students a copy of the piece of paper "Don't drop it" (you'll find it on page xiii of the annex-unit 1) and talk about the rules that one must take into consideration when using a microscope. It may be interesting to ask students to copy the main rules (in red on the piece of paper).

Then ask them to take a microscope and give each pair of students a copy of the piece of paper "Microscope parts" (you'll find it on page xii) and let them "investigate" a microscope.

Later on it will be their turn to try to remember microscope parts.

Give every student a copy of a picture of a microscope picture ready to be labelled (you'll find two different copies ready to be photocopied on pages x & xi of the annex-unit 1) and ask students to label it and glue it in their jotter. Here are the two copies of the microscope already labelled.



Lab practice 1.2. What's the the image of a microscope like? & How do we calculate magnification?

**Procedure:** Students will observe a small piece of paper with a letter written on it in order to realize how a microscope shows images.

On pages vii, viii & ix of the annex (unit 1) there is a laboratory procedure ready to be photocopied and be given to students to help with this introduction to the microscope. You can choose between asking students to copy the protocol into their jotter, so they won't write on the piece of paper, or letting them write on it and then glue it in their jotter.

The student's introduction to the laboratory is divided into three sections:

**Part A: Handling a Microscope**

**Part B: Calculation of magnification.**

**Part C: Preparing a wet mount of the letter "e".**

They can be done all together or on different days and they allow students to get used to the microscope.

There are some questions at the end of part C, and also throughout the activity. Here are the answers.

**Part A: Handling a Microscope**

4. Let's explore the microscope. What are the functions of the following parts of the microscope?

- a) diaphragm.- the diaphragm controls the light intensity
- b) ocular.- the ocular is a lens that magnifies the mount.
- c) objective.- the objective is a lens that magnifies the mount. It's near the object
- d) course adjustment.- the course adjustment allows you to focus at high power
- e) fine adjustment.- the fine adjustment allows you to focus at low power
- f) stage.- the stage holds the mount.

**Part B: Calculation of magnification.**

To determine the minimum and the maximum total magnification of the microscope students only have to multiply eyepiece magnification by objective magnification. There are different answers as not all microscopes have the same magnifications.

**Part C: Preparing a wet mount of the letter "e".**

18. A) The image we see through the microscope is areversed and inverted "e" because the lenses (eyepiece and objective) turn the images upside down and left to right.

19. When moving the slide up and to the right it moves down and to the left in the microscope field.

20. When moving the slide down and to the left the image moves up and to the right.

**Conclusion Questions:**

1. Always carry the microscope with two hands  
Do not touch the lenses  
Store the microscope set on the lowest objective, and...  
with the nosepiece turned down to its lowest position  
Cover microscope with a dust cover
2. It is called a compound microscope because it has two lenses.
3. It means that the image is upside down and turn from left to right.
4. Because when we move from low to high power the field reduces.
5. A microscope has a 20 X ocular (eyepiece) and two objectives of 10 X and 43 X respectively:
  - a.)  $20 \times 10 = 200 \text{ X}$ .
  - b.)  $20 \times 43 = 860 \text{ X}$
6. This is an open activity where students write down sentences. Remind students to number sentences and use infinitives. It may be necessary to allow students to write the sentences in their mother tongue.
7. When we go from low to high power the field of view gets smaller and there is also less light intensity.
8. First it is necessary to centre the mount in the middle of the view field (so it will appear in the high power field) and open the diaphragm to increase the light intensity.
9. At high power we use the fine adjustment to focus and at low power we use the course adjustment.

**From page xvi on of the annex (unit 1) you'll find some lab activities consisting of the observation of cells. They are ready to be photocopied and be given to students.**

**Lab practice. Making and staining wet mounts.**

Part A. Human cheek cells

Part B. Onion root cells

**Lab practice. Observation of prepared slide of blood cells.**

**Lab practice. Observation of pond or aquarium water.**

**Lab practice. Observation of yeast cells.**

**Lab practice. More about microscopes.**

Don't know much about history

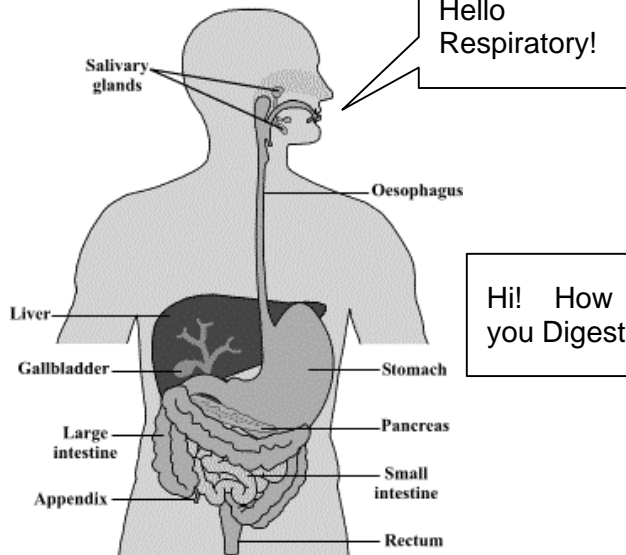
On pages xiv & xv (unit 1) of the annex you'll find a text called "Don't know much about history" followed by some questions. It could be used as extra material for advanced students. There are different ways to work with this text. One of them can be asking students to read it and answer some questions. Here are the answers:

1. Italian monks developed the art of grinding lenses in the 14<sup>th</sup> century; these lenses were made into spectacles to improve the monks' failing eyesight.
2. The first compound microscope was mounted, in 1590, by Hans and Zacharias Janssen (Dutch lens grinders)
3. A compound microscope is a tube with two lenses mounted in it.
4. Robert Hooke used a compound microscope to observe thin slices of cork cells from 'cork oak' trees
5. He chose cork because it was economically very valuable to the English and their ship-building industry.
6. Leeuwenhoek used a simple microscope (1 lens) to look at blood, rainwater, teeth scrapings, etc.
7. A light compound microscope is a compound microscope that uses mirrors or a light source to see the specimen in a better way.
8. Transmission electron microscopes were invented in the 1930's. They form an image by electrons passing through a specimen. They are capable of higher resolution than the scanning electron microscope.
9. Cells can only be discovered by looking through microscopes.
10. Anton Van Leeuwenhoek said "Look at the wee-beasties".

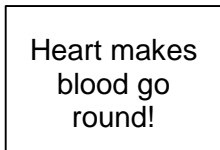
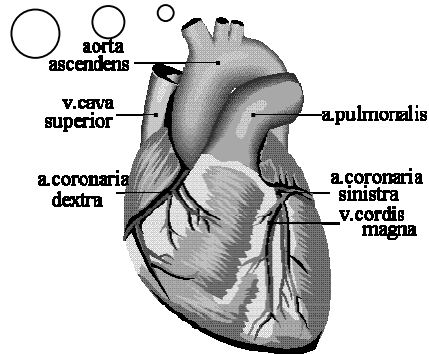
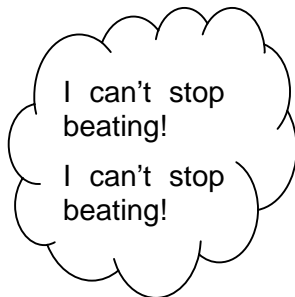
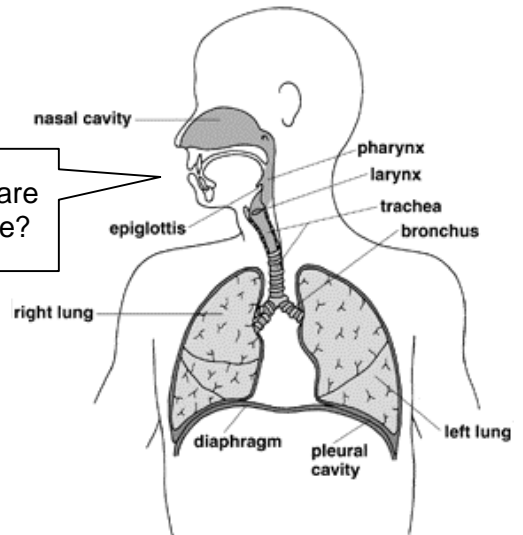


# Unit 2. Nutrition

## Human Digestive System

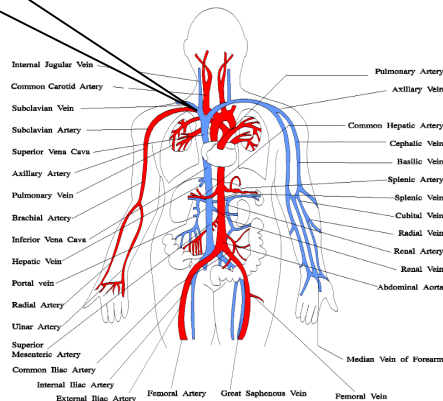


## Human Respiratory System

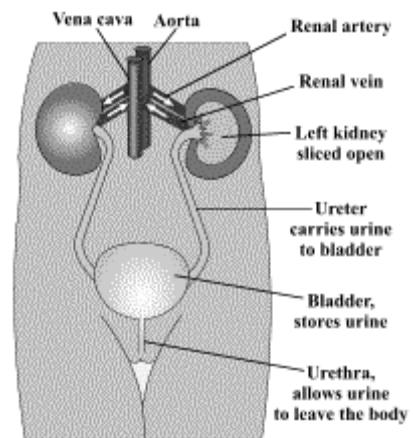


## Blood Circulation

Principal Veins and Arteries



## The Urinary System



The kidneys remove harmful waste products such as urea from the blood. Water and glucose are also filtered out, but are reabsorbed in the kidney tubules. The renal artery takes unpurified blood to the kidney, and the renal vein takes the purified blood back into the bloodstream.

WALT: What am I learning today?

By the end of this unit I will know:

- Why we eat
- Why we breathe
- How the digestion works
- What the parts of the digestive system are
- What the parts of the breathing system are
- What the parts of the circulatory system are
- How the heart beats
- What the parts of the excretory system are

Multicellular livings had to “invent” a system to bring nutrients to all the cells in the body and, at the same time, to take away waste materials.

So all multicellular livings have some systems specialised on the function of nutrition. Those systems are:

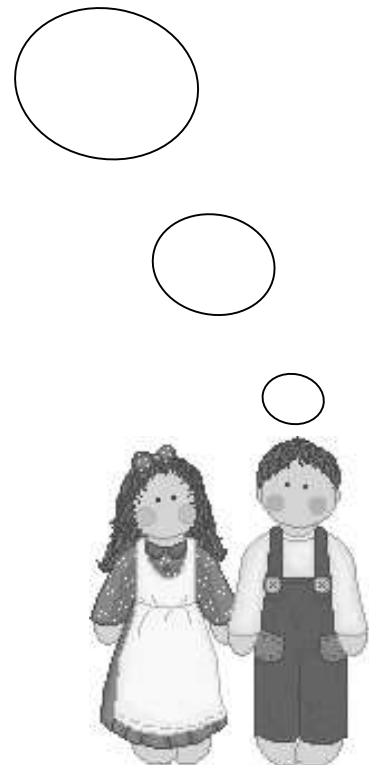
Digestive system, the system that processes food

Respiratory system, the system that allows gas exchange

Circulatory system, the system that carries gas, nutrients and waste to all cells.

Excretory system, the system that excrete waste.

In this unit we will learn how they work.





**Activities from pupil's textbook.****ACTIVITY 1. Let's try peristalsis movement.**

(Page 28 in pupil's textbook)

This is a practical activity that can be done in the laboratory or in class, but it may be interesting to do it with a small group of students.

AIM: To help students realize how the peristalsis movement works.

**ACTIVITY 2. Down the tube.**

(Page 32 in pupil's textbook).

AIM: To recap all parts and function of the digestive system.

Here are the answers, every part with the appropriate explanation, and in the right order:

Mouth	Food chewed and mixed with saliva. Then you swallow it (gulp!) (Food is here for 20 seconds)
Gullet or oesophagus	A straight, muscular tube leading to your stomach. (10 seconds)
Stomach	The acid bath! Digestive juices and acid are added to food here. The mixture is churned up (2 to 6 hours)
Small intestine	More juices are added from your liver and your pancreas. These complete digestion. Then food passes through into your blood. This is called <b>absorption</b> . (About 5 hours)
Large intestine	Only food that can not be digested (like fibre) reaches here. A lot of water passes back into your body. This leaves solid waste to pass through your anus. (up to 24 hours)

And, of course, the answers to the questions are:

1. In which part of your gut does food stay the longest?

*The food stays longest in the large intestine.*

2. Proteins are digested in your stomach. What are conditions like here?

*The conditions in the stomach are like an acid bath, with digestive juices.*

3. How long does it take food to pass down the whole length of your gut?

*It takes food 31 to 37 hours (20 seconds+10 seconds+2 to 6 hours+5 hours+24 hours) to pass down the whole length of the gut. MORE THAN ONE DAY!!!*

### ACTIVITY 3. Copy and complete.

(Page 32 in pupil's textbook)

The whole text with the correct words is as follows:

Digestion is the break down of food into very small molecules by chemicals called enzymes. Food has to be digested so that it can pass through the gut wall into blood. Starch is digested to glucose but fibre cannot be digested.

### ACTIVITY 4. Levels of organization.

(Page 33 of pupil's textbook)

The respiratory organs in the right order are as follows:

Nostril, nasal cavity, pharynx, larynx, trachea, bronchus, lung, bronchioles, alveoli.

Air goes in through the nostril & into the nasal cavity. The pharynx is the area in the back of the throat, the larynx (voice box) is just below (posterior) to that. Air then travels down the windpipe (trachea), which branches into two bronchi (one bronchus leads to each lung). Once inside the lung the bronchi branch out into smaller tubes called bronchioles which lead to clusters of air sacs. The air sacs are called alveoli.

### ACTIVITY 5. Air breathed in and breathed out.

(Page 35 in pupil's textbook)

Here's the table with the missing words in it:

Air breathed in	Air breathed out
It contains more O <sub>2</sub>	It contains <u>less O<sub>2</sub></u>
It contains <u>less CO<sub>2</sub></u>	It contains more CO <sub>2</sub>
It contains the same <u>nitrogen</u>	It contains the same <u>nitrogen</u>
It contains less <u>water vapour</u>	It contains more <u>water vapour</u>
It is less <u>clean</u>	It is <u>cleaner</u>
It is <u>colder</u>	It is <u>warmer</u>

### ACTIVITY 6. Puffing and panting.

(Page 36 in pupil's textbook)

This is a practical activity that could be done either in the lab or in class, but it maybe more practical to do it with a small group of students. It could be interesting to do this activity at the same time as the lab practice "problem solving" that can be found on page lxi of the annex.

Here are the answers to the final question (step 6):

A) After exercise has your breathing rate increased or decreased?

*After exercise the breathing rate increases*

B) What happens to the length of each breath in the investigation?

*After exercise the length of each breath increases. Every breath is longer than at rest.*

C) What do you think affects your breathing rate and your depth of breathing?

*With exercise cells need more energy so they need more oxygen in order to carry out respiration. As a result the breathing rate increases to allow more gas exchange (more oxygen into blood).*

### **ACTIVITY 7. Copy and complete:**

(Page 36 in pupil's textbook)

The whole text with the correct words is as follows:

We breathe in air containing nitrogen, oxygen and some carbon dioxide. The air that we breathe out contains the same amount of nitrogen, less oxygen and more carbon dioxide. The air we breathe out also contains more water vapour, it is at a higher temperature and it is cleaner.

### **ACTIVITY 8. The circle of life.**

(page 37 in pupil's textbook) The answers to the questions are:

- a) Digested food;   b) oxygen;   c) carbon dioxide;   d) oxygen and food;  
e) carbon dioxide and waste(urea);   f) waste (urea)   g) the heart

### **ACTIVITY 9. Blood vessels in the human body.**

(Page 38 in pupil's textbook) Give each pupil a copy of the blood vessels diagram (it can be found on page i (unit 2) of the annex). They have to label it and then glue it in their jotter.

You can choose between giving a list of the answers and letting pupils match them or giving a blood vessels diagram already labelled (it can be found on page ii) and letting pupils look for the answers. This second case could be more suitable for less-able & slowing-working pupils, and the first one for more-able & hard-workers.

Here are the answers:

1. Heart;   2. Aorta artery;   3. Coronaries arteries;   4. Carotid artery;  
5. Jugular vein;   6. Pulmonary artery;   7. Pulmonary vein;  
8. subclavian vein;   9. Radial artery;   10. Superior vena cava;  
11. Inferior vena cava;   12. Renal artery;   13. Renal vein;  
14. Hepatic artery;   15. Portal vein;   16. Femoral artery;  
17. External tibial artery;   18. Internal safena vein.

### **ACTIVITY 10. Around and around.**

(Page 39 in pupil's textbook) This is quite an open activity as each pupil may have a different heart rate. For a heart rate of 70 beats per minute the answers would be:

- a) 4,200                                      b) 100,800                                      c) 36,792,000

**ACTIVITY 11. Copy and complete.**

(page 40 in pupil's textbook) Here is the full text with the correct missing words:

Blood is pumped around my body by my heart. Blood travels away from my heart in arteries and back to my heart in veins. The tiniest blood vessels are called capillaries and these have very thin walls so things can pass in and out. When I feel my pulse I am touching an artery.

The heart is made out of muscle. The blood on the left-side contains more oxygen than the blood on the right-side. This is because the blood has just come back from the lungs. The left-side of the heart pumps blood all around the body. The heart has valves to stop the blood from flowing backwards.

**ACTIVITY 12. Mind map.**

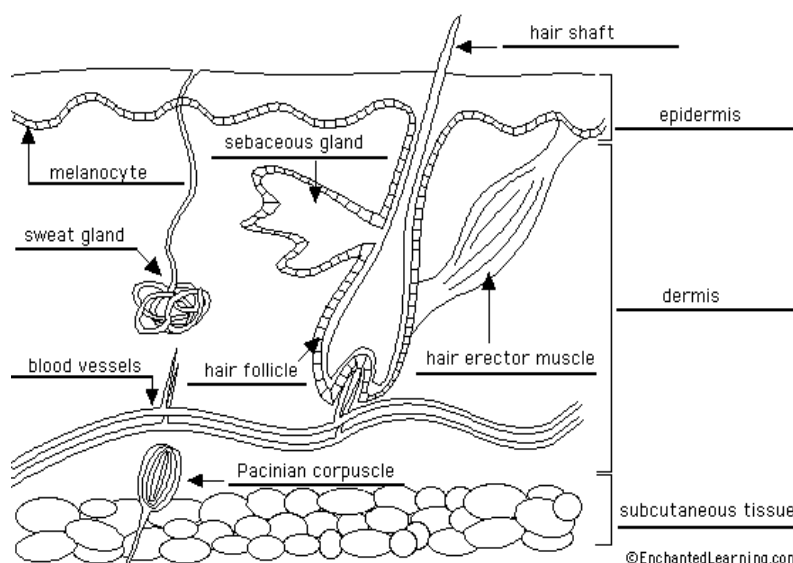
(page 41 in pupil's textbook) Pupils make a mind map with concepts learned. The Words they use are just a proposal and are grouped.

Teacher could ask pupils to make a second mind map about the breathing system. Here is a list of some concepts to be used in this second map mind:

Keeping lungs clean	Breathing rate	Why do we breathe?	How we breathe?	Gas exchange	What is breathing?
<i>Mucus Tiny hairs</i>	<i>What is it?</i>	<i>Respiration</i>	<i>Breath in breath out</i>	<i>Alveoli Capillary</i>	<i>Take in oxygen give out carbon dioxide</i>

**ACTIVITY 13. Draw and Label!**

(page 42 in pupil's textbook) Pupils have to copy the drawing of the urinary system and label it with the words. The correct words beginning at the top right and clockwise are: Renal artery, kidney, aorta artery, bladder, urethra, ureters, cava vein, renal vein.



To complete the excretory system, teachers may ask pupils to label a drawing of skin. A blank drawing can be found on page iii (unit 2) of the annex.

Here are the answers to the drawing.

And also some information about skin:

The skin is an organ that forms a protective barrier against germs (and other organisms), keeps the inside of your body inside your body, and keeps what's outside of your body outside. Skin also helps maintain a constant body temperature. Human skin is only about 2 mm thick.

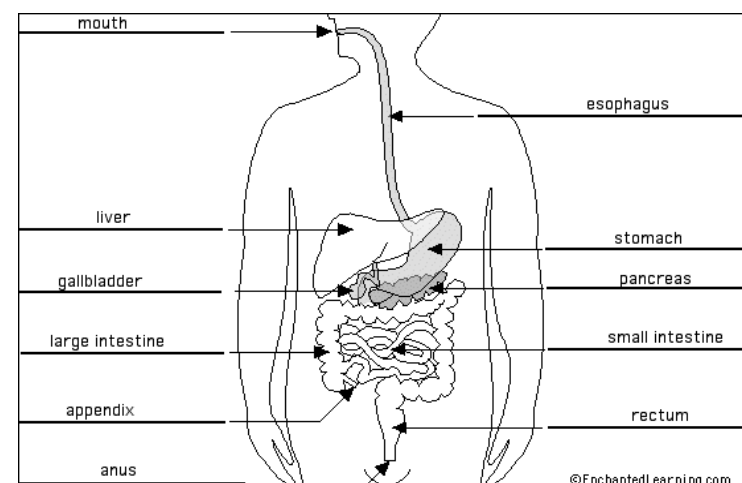
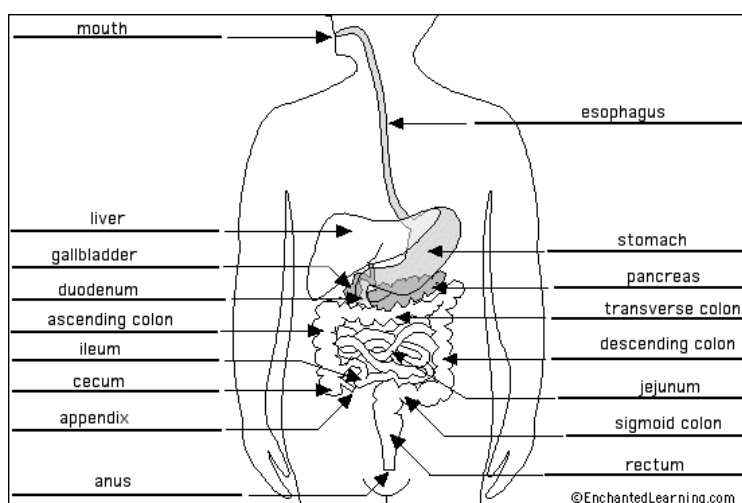
Skin is made up of two layers that cover a third fatty layer. The outer layer is called the epidermis; it is a tough protective layer that contains melanin (which protects us against the rays of the sun and gives the skin its colour). The second layer (located under the epidermis) is called the dermis; it contains nerve endings, sweat glands, oil glands, and hair follicles. Under these two skin layers is a fatty layer of subcutaneous tissue (the word subcutaneous means "under the skin").

On average, an adult has about 2 square meters of skin, which weighs about 2.7 kg.

**From now on you'll find extra activities and laboratory activities to be used with students in order to consolidate their knowledge about this unit. There are no references to all these activities in the pupil's textbook.**

### ***Extra activities***

#### **Label the Digestive system**



Give each student a copy of the digestive system and ask them to label and colour it. It could be useful to ask students to write not only the name of the structure but also the function. You can find a copy of the picture ready to be photocopied on pages iv & v of the annex (unit 2). Here are the answers. There are two versions of the digestive system to label. One is a simple version. Teachers may choose between one or the other depending on the pupils.

### Digestive: Glossary

Give every student a copy of the digestive vocabulary and of the explanations. They have to match both of them and then glue them in their jotter. Here are the answers. Sentences and digestive vocabulary ready to be photocopied can be found on pages vi&vii of the annex (unit 2).

Part of System	Function
Mouth	First part of the digestive system.
Teeth	Used for biting and tearing off food.
Salivary glands	Saliva provides some enzymes to start breaking down cooked starch.
Stomach	Churns food up to allow digestive juices to get at every bit of the food. Digests protein.
Liver	Stores glycogen, makes bile, removes excess nitrogen, and many other toxins from the body.
Gallbladder	Stores bile, which is added to food in the small intestine..
Pancreas	Produces insulin, regulates blood sugar level and converts glucose to glycogen.
Small intestine	Food is broken down and absorbed through villi.
Large intestine	Water is absorbed, and faeces are formed
Rectum	Faeces fully formed and stored.
Anus	Faeces get to the outside world from here.

### Digestion summary

This is an advanced activity for students with high level of English.

**Procedure:** Give every student a copy of the text with some blanks, they can be found on page viii of the annex (unit 2), and ask them to complete it with words from the box. Once finished, the teacher may also ask pupils to translate the text into their mother tongue.

Here is the complete text, already corrected:

Food is digested from large insoluble molecules into small soluble molecules.

In the mouth, teeth chew food into smaller particles. The food particles then move down the oesophagus (gullet) into the stomach where it is churned up, to allow digestive enzymes and acid to get at it more easily. Food leaves the stomach and is further digested in the small intestine. Digested food particles pass through villi in the walls of the small intestine.

Amylase is an enzyme found in saliva, which breaks starch into glucose. Fats are digested by the enzyme lipase in the small intestine. The enzyme pepsin in the stomach digests proteins.

The small intestine absorbs the maximum amount of food, as it is very long, and has a large surface area.

The large intestine absorbs water from food.

Bile is made by the liver, and stored by the gall bladder,

The pancreas makes insulin.

### Breathing in and out.

A copy of this activity (and the next one “Respiration” can be found, ready to be photocopied on page ix of the annex-unit 2). Pupils **should NOT write** on the sheet, they should copy everything into their jotter.

It could be interesting to do this activity just after lab activity 3 (see page 34 in this book).

The correct answers to the table are as follows:

	Breathing in	Breathing out
What do the ribs do?	The ribs move <b>out and up</b>	The ribs move <b>down and in</b>
What does the diaphragm do?	The diaphragm moves <b>down</b>	The diaphragm moves <b>up</b>
What happens to the space inside your chest?	The space inside your chests gets <b>bigger</b>	The space inside your chests gets <b>smaller</b>
What happens to your lungs?	Your lungs get <b>full (inflate)</b>	Your lungs get <b>empty (deflate)</b>

### Respiration

Here is the text with the correct words:

I get energy from the food I eat. Food like sugar has a lot of energy in it.

To get the energy out of the sugar I have to break it down in my body using oxygen. This is called respiration.

Oxygen is taken into my body when I breathe in.

When I do exercise I need more energy to help my muscles work.

To get more energy I have to breakdown more sugar. I also have to breathe in more oxygen. This is why my breathing rate goes up when I do exercise.

### Digestive and respiratory system: Quiz

**AIM:** To write complete sentences to recap the unit.

**Procedure:** Students write down in their jotter the complete sentences (questions and answers). This quiz is designed to be used with fast workers

& more-able pupils (Pupils with a high level of English) as questions need full answers. Teachers may also choose to leave students free to answer the questions in their mother tongue rather than in English.

You can find the quiz, ready to be photocopied on page x of the annex (unit 2). Here are the answers:

1. The 5 main things food is needed for are: movement, growth, tissue repair, body heat and fighting disease.
2. Starch is made from long chains of glucose.
3. The sub-units of protein are amino acids.
4. The enzyme that breaks down protein in the stomach is pepsin.
5. Amylase is the enzyme found in saliva.
6. The enzyme that breaks down fat is lipase.
7. Food is absorbed in the small intestine.
8. In the large intestine we absorb water and electrolytes.
9. It is true.
10. The stomach churns the food and bathes it in a very strong acid
11. Bile is made in the liver.
12. Bile is stored in the gall bladder.
13. The tube that goes from mouth to lungs is called the trachea or windpipe.
14. The two tubes that carry air into the lungs are called bronchi.
15. The small air sac is called alveoli.
16. The air sac is well designed for exchanging gases because it is surrounded by capillaries and it is only one cell thick.
17. The two gases exchanged in the lungs are O<sub>2</sub> and CO<sub>2</sub> (oxygen and carbon dioxide).
18. The lungs are protected by pleura and the ribs.
19. When you breathe in the diaphragm moves down.
20. When you breathe in the ribs move out and up.
21. The surface of the alveoli is covered by capillaries.
22. The function of mucus is to trap dust and germs.
23. We breathe in oxygen
24. We breathe out carbon dioxide.
25. The diaphragm is made of muscle.

### **Label those systems!**

On page xi of the annex (unit 2) there are a couple of diagrams of the respiratory and the digestive systems. Just photocopy the page and ask students to glue it in their jotter and label all the parts of both systems (It will help if they look at their notes in their jotter and the book).

### **Respiratory summary**

This is an advanced activity for fast workers & more-able pupils.

**Procedure:** Give every student a copy of the text with some blanks (can be found on page xii of the annex-unit 2) and ask them to complete it with words



from the box. Once finished, teachers may also ask pupils to translate the text into their mother tongue.

Here is the complete text, already corrected:

Our lungs are designed for exchanging gases, they breathe in oxygen and breathe out carbon dioxide. This exchange of gases happens in the air sacs (alveoli). These are at the very end of the airways in the lungs.

The oxygen diffuses from the lungs into the blood; the heart then pumps the blood around the body, where the cells perform respiration using the oxygen. The respiration process releases the energy we have taken in from our food.

Carbon dioxide diffuses out of the cells as a waste product of respiration. It then goes into the bloodstream to the lungs where it is breathed out.

The respiration system starts in the mouth and nose where air is breathed in. It goes from there down the trachea (windpipe) and from there to the bronchi, the bronchioles and eventually to the alveoli (air sacs).

The trachea is lined with cells. These cells are edged with tiny hairs called cilia, and cells which make mucus. The mucus traps dust and germs, which are then swept upwards by the tiny hairs. When the mucus reaches the throat it can be swallowed, then it goes into the stomach where the stomach acids kill the germs.

### Reading comprehension

On page xiii of the annex (unit 2) you'll find a text called "**What have we learnt about the respiratory system?**" It could be used as extra material for fast workers & more-able pupils. There are different ways to work with this text. One example is asking pupils to read it and answer some questions. Here are the answers. At the end pupils can translate the text into their mother tongue.

1. The Lungs are found in the chest and they are protected by the rib cage.
2. Air enters the nose and mouth, and then goes down the windpipe (then the bronchi and bronchiole) until it gets to the air sacs.
3. The oxygen passes from the air into red blood cells, who carry it all around the body
4. Carbon dioxide passes from the blood to the air sacs to be breathed out.
5. Mucus traps dirt and germs which are then swept up into the throat and swallowed.
6. When we breathe in our ribs move out and up and the diaphragm moves down.
7. When we breathe out our ribs move in and down and the diaphragm relaxes.
8. Smoke contains nicotine, tar and carbon monoxide.
9. Cigarette smoking destroys the small hairs.
10. Translate the text into your mother tongue.

### Breathing System Crossword

On page xiv of the annex (unit 2) there's a copy of the crossword ready to be photocopied and given to pupils (make sure they glue it in their jotter); here you'll find the answers.

- |          |             |              |
|----------|-------------|--------------|
| 1. mucus | 4. hairs    | 7. blood     |
| 2. lungs | 5. air sacs | 8. bronchus  |
| 3. germs | 6. ribs     | 9. diaphragm |

#### Clues Across

- 2. They are protected by the ribs.
- 5. Little bags found at the end of the air passages.
- 6. These protect the lungs.
- 9. A sheet of muscle stretched across the bottom of the rib cage.

#### Clues Down

- 1. Sticky substance found in the windpipe.
- 3. Trapped by the mucus in the windpipe.
- 4. They beat to sweep dirt away from the lungs.
- 7. This is carried in vessels to the lungs.
- 8. Air enters the lungs through this.

### Circulatory system

This activity can be used as a recap activity of the circulatory system. Give pupils a copy of the diagram and make them label it. On page xv of the annex (unit 2) there's a copy ready to be photocopied. The answers to the drawing are:

For the four squares:

Top one: head and arms

Left one: right lung

Right one: left lung

Bottom one: general circulation

All the rest, beginning with the top one and going clockwise:

Carotid and subclavian  
arteries

Intestinal artery

Right ventricle

General capillaries

Tricuspid valve

Pulmonary artery

Portal vein

Right atrium

Left atrium

Liver

Pulmonary vein

Left ventricle

Hepatic vein

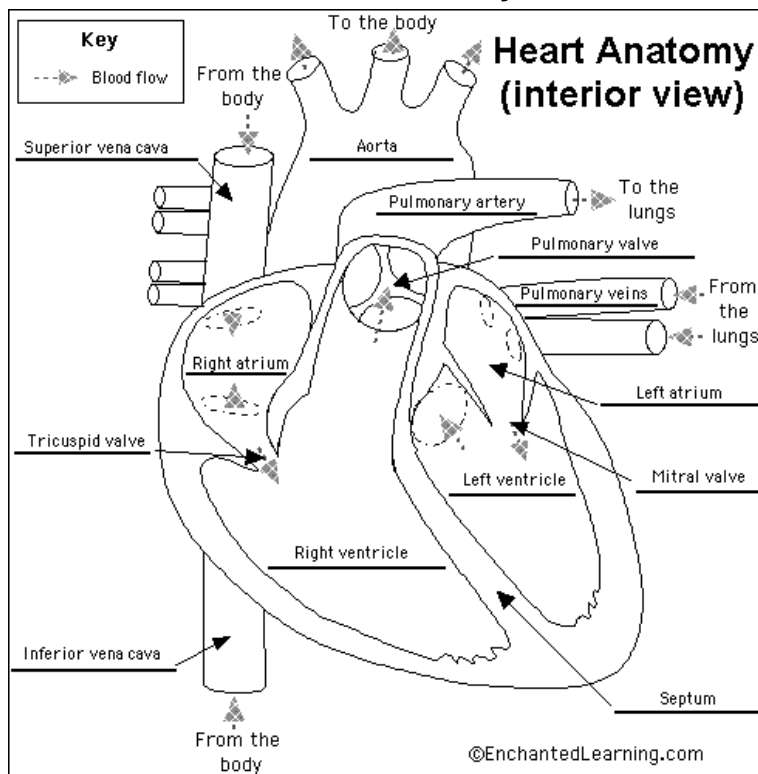
Superior vena cava

Mitral valve

Inferior vena cava

Aorta artery

### Label a heart! Internal anatomy



Give each pupil a copy of the heart and ask them to label and colour it (blue colour for deoxygenated blood and red for oxygenated blood). You can find a copy of the picture ready to be photocopied on page xvi of the annex (unit 2). Here are the answers.

Teachers can choose between giving pupils a list of words or not. There is a list of the words and explanations of them on page xvii of the annex (unit 2)

### Cardiovascular system word find

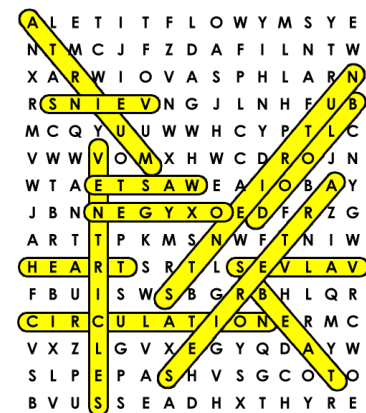
Give each pupil a copy of page xviii of the annex (unit 2) and ask them to find the words. It could be a good exercise for slower workers & less able pupils. Here are the answers.

#### What am I? Vein, artery, capillary or heart

This activity allows pupils to recap the main characteristics of an artery, a vein and the heart. Just give every pupil a copy of the explanations. They have to put them into the right column (vein, artery, capillary or heart) and glue them in their jotter. Here are the answers (sentences ready to be photocopied can be found on page xix of the annex-unit 2).

#### Cardiovascular System Word Find Solution Page

Directions: Print out the word find solution page. See how many words you were able to find.



WORD BANK			
-ARTERIES-	-BLOOD-	-NUTRIENTS-	-VEINS-
-ATRIUM-	-CIRCULATION-	-OXYGEN-	-VENTRICLES-
-BEAT-	-HEART-	-VALVES-	-WASTE-

Arteries	Thick-walled, carry blood away from the heart Carry oxygenated blood (high levels of oxygen)
Veins	Carry deoxygenated blood Contain valves which help prevent the backflow of blood Thin-walled, carry blood toward the heart

Capillaries	Very thin-walled (one cell thick) Connect arterioles and venules Site for the exchange of materials between the blood and body cells
Heart	Composed of cardiac muscle It is a 4-chambered pump composed of 2 atria and 2 ventricles

### Reading comprehension: YOUR HEART!

On page xx of the annex (unit 2) you'll find a text called "Reading comprehension: **YOUR HEART!**" It could be used as extra material for fast workers & more able pupils. You can exploit this text by asking pupils to read it and answer some questions. Here are the answers. At the end pupils can write a summary of the text in their mother tongue.

### Recap nutrition quiz!

This is a kind of "test" with some short questions about the whole unit, to help pupils recap all they have learnt. Just give pupils a copy of the quiz and ask them to use their jotter to write down the answers. It may be more interesting if pupils write down questions as well (it can be homework! There's a copy of the quiz from page xxi to xxiv of the annex (unit 2).

Here are the answers:

1. Glucose + ...oxygen.. → carbon dioxide + ...water... [+ Energy]
- b) See page 27 of pupil's book. We need energy for: Growth, movement, body heat, tissue repair, fighting disease.
2. a) i) E (long intestine); ii) J (small intestine); iii) B (gall bladder)  
b) A (mouth); c) Digestive system
3. a) Diaphragm; b) abdomen; c) When a person breathes out A (diaphragm) goes up and B (ribs) go down. d) Respiratory system  
e) lungs; oxygen; blood; carbon dioxide; breathing; energy
4. a) Haemoglobin; b) transport oxygen; c) they have no nucleus, they are small and flexible
5. amino acids; bloodstream; liver; circulatory; kidneys; plasma; bladder;
- 6.

substance	origin	destination
carbon dioxide	All body cells	Lungs; exit: breathe out
urea	all body organs	Kidneys
soluble digestion products	Food	organs of the body

7. a) Right atrium; b) left ventricle; c) to stop the blood from flowing backwards; d) arteries; thick; fibres; capillaries; thin; veins; valves.

8. a) A (red blood cells); b) C (cells with tiny hairs from the trachea) they carry the mucus up to your nose and throat. C) B (white cells) They can engulf and break down or send out an antibody.

9. a) Carbon dioxide; b) it turns milky c) Tube A d) The air we breathe in contains more  $O_2$ ; it contains less  $CO_2$ ; it contains less water vapour; it is not so warm; and it is not so clean.

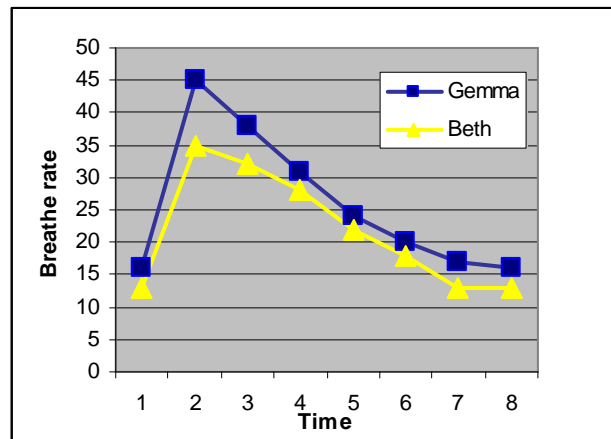
10.

b) It took longer to Gemma to recover from the exercise

c) So Beth is fitter:

because she recovered in less time

because she had a lower breathing rate at rest.



11.

A	B
Superior Vena Cava	Brings deoxygenated blood from the upper portion of the body and into the right atrium
Inferior Vena Cava	Brings deoxygenated blood from the lower portion of the body and into the right atrium
Pulmonary Artery	Receives blood from the right ventricle and transports it to the lungs
Pulmonary Vein	Receives oxygenated blood from the lungs and transports it to the left atrium
Aorta	Receives blood from the left ventricle and transports it to the rest of the body
Pulmonary Circulation	The pathway from which blood flows from the heart to the lungs and back to the heart
Systemic Circulation	The pathway that carries blood from the heart to all parts of the body with the exception of the lungs
Coronary arteries	Supply oxygenated blood to the muscle tissue of the heart

12. a) 5; b) 3; c) 1; d) 2; e) 4

### No doubts!

On pages xxv, xxvi & xxvii of the annex (unit 2) there is a wee multiple choice test to help pupils auto evaluate their knowledge.

Here are the answers to the questions in the “no doubts!” test.

1. a) under lungs; b) inside lungs; c) heart & veins; d) organs of the body
2. a) red blood cells(Haemoglobin) b) white blood cells c) plasma d) Platelets

3	B	4	C	5	B	6	D	7	D	8	B	9	A	10	D
11	B	12	B	13	C	14	C	15	D	16	A	17	A	18	B
19	B	20	A	21	C	22	C	23	A	24	B	25	D	26	C
27	A	28	D	29	C	30	D								

### **Power point presentations.**

This unit has several power points presentations that can be used at the beginning of the unit as an introduction to the topic or at the end of it as a recap activity.

Go to unit 0 (page 5) to find a description of all power points presentations together with an explanation of them.

### ***Laboratory activities***

**From page xxviii on of the annex (unit 2) you'll find some lab activities. They are ready to be photocopied and be given to pupils.**

Those laboratory procedures are ready to be photocopied and given to pupils. You can choose between asking students to copy the protocol into their jotter, so they won't write on the piece of paper or letting them write on it and then glue it in their jotter.

#### **Lab practice. Let amylase do its job.**

The ability of the enzyme amylase, found in human saliva, to hydrolyze or break down starch molecules will be demonstrated in this lab activity. The activity of the enzyme in various pH solutions will also be demonstrated.

#### **Lab practice. A change of air.**

In this lab activity pupils demonstrate that the air we breathe out contains a larger amount of CO<sub>2</sub> than the air we breathe in.

#### **Lab practice. How do you get oxygen into your body?**

This activity is a demonstration of the mechanics behind breathing. The idea is to show how breathing works, looking and maybe making a simple apparatus that works as lungs do.

For this lab activity teachers can choose between the whole activity (where pupils have to make their own lung model) or just answering the questions looking at the picture.

It could also be interesting to do this lab practice just before the extra activity called "Breathing in and out" (on page 39 on this book).

**Lab practice. Problem solving.**

This lab practice could be done at the same time as activity 6 "Puffing and panting" (Page 36 on pupil's textbook, answers on page 34 on this book).

In this activity pupils practice graph drawing. There are two different graphs to be done; teachers can choose to let slow pupils do just the first one.

The third part is a question about a graph.

**Lab practice. What is it in our food?**

In this lab practice pupils learn how to test for starch, glucose, proteins and fat. First of all they may try with solutions that the teacher should have already prepared and they can, later on, try with some food or drinks.

At the end of this lab practice there is an activity where pupils have to plan an experiment. Teachers may choose to give pupils the opportunity to do it in English or in their mother tongue.

**Lab practice. A model gut.**

Here, pupils will make a "model gut" in order to realize that small molecules such as glucose can pass through it but large ones such as starch cannot. They will, therefore, understand the necessity of digestion.

**Lab practice. Plaque attack.**

This is an extra lab activity. Pupils can practise bacteria growing and at the same time do some research. For this activity it will be necessary to, previously, explain some microbiology lab rules.

It also gives the opportunity to make pupils do a research about how toothpaste works. The teacher may ask pupils to do that (internet research, for example).

**Lab practice. Take your pulse rate.**

In this lab activity pupils learn what the pulse rate is and where and how to take it.

There is a power point presentation available to be used in this lab activity. It shows how to take the pulse rate, it gives instructions about the activity, it explains what factors can alter the pulse rate and it shows what recovery time means. It may be shown to pupils before the lab practice to make sure they understand what they are doing.

**Lab practice. Listen to your heart.**

In this lab activity pupils will listen to the sounds of their heart using a stethoscope and they also learn how to measure blood pressure using a sphygmomanometer.

There are two power point presentations available to be used in this lab activity; they can be shown to pupils before the lab practice starts.

- a) "Heart structure and heart sounds" is a summary of heart structure and also explains heart sounds and systole and diastole contraction of the heart.
- b) "All about blood pressure" shows how to use a sphygmomanometer and what blood pressure means and gives instructions, step by step of how to do the lab practice.

This activity could take 2 lab sessions. One session for the first part (listen to the heart) and a second session for the rest.

### Things to do. Answer to question 6

A	B
Angina Pectoris	Blockage of the coronary artery resulting in oxygen deficiency in the heart muscle
High Blood Pressure	Increased pressure in the arteries due to stress, diet, cigarette smoking, and aging
Diastole	Is the period when the ventricles are filling with blood. The A-V valve is open and blood flows from the atrium to the ventricle
Systole	Is the period when the ventricle pumps blood out of the heart. A-V valve closes and the semi-lunar valve opens
Cardiovascular Diseases	Are diseases of the heart and blood vessels
Coronary Thrombosis	Narrowing of the coronary artery causing an inadequate supply of oxygen to the heart muscle
Sphygmomanometer	Instrument used to measure the pressure of the blood in the artery of the arm

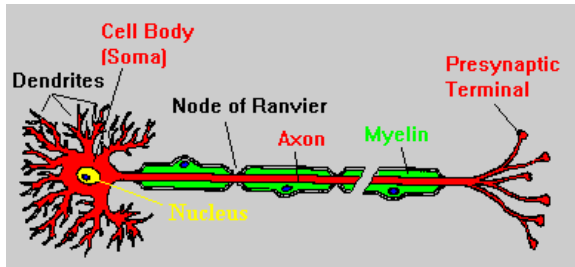
### Lab practice. Heart dissection.

In this lab activity pupils will do a dissect a pig's heart which is very similar in size, structure and, of course, function to the human one.

There is a power point presentation (Heart dissection) available to be used with this lab activity. It may be interesting to show it to pupils before doing the dissection so they know what they are going to do and see (the presentation has different pictures of real hearts) or just use it at the same time to guide pupils thought the dissection.

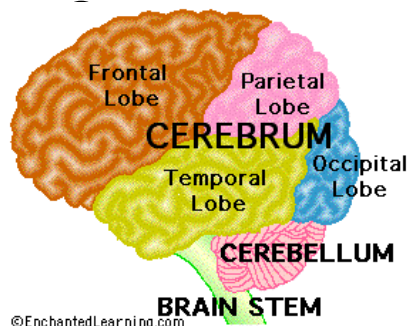


# Unit 3. In touch with the world

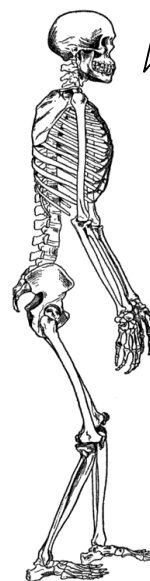


Build a body

Your brain:  
Use it or lose it!



Want to know more?  
Just follow me!



WALT: What am I learning today?

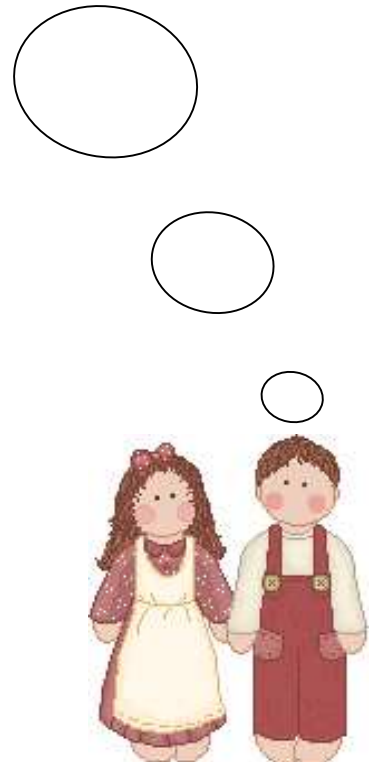
By the end of this unit I will know:

- How we communicate with the outside world
- How the nervous system works
- A special kind of cell: The neuron.
- The main parts of the muscular and skeleton systems
- What the endocrine system is and how it works

All organs and body systems are co-ordinated. They cooperate with each other to work together. This brings about the functions that are vital to a healthy life. For example, if you exercise hard, your heart beat increases, and you breathe faster to take in more oxygen.

The sense organs are also co-ordinated. If you are playing a ball game, your eyes see the ball, they pass signals to the brain, and central nervous system (CNS), which then helps you to react and hit or catch the ball.

All of these functions are co-ordinated by the brain and CNS. Messages from your eyes and ears are passed to the brain, which in turn sends nerve impulses down your spinal cord, and then to the muscles you need to move. The nerve impulses also make your heart beat faster and make your diaphragm contract faster so you take in more air for the extra oxygen you need for the increased energy you use for all physical activities.



**Activities from pupil's textbook.****ACTIVITY 1. Quick reaction.**

(Page 47 of pupil's textbook book)

This is quite an open activity; some of the sentences can be as follows:

The skin receptors detect a stimulus; in this case a very hot object. This creates (triggers) a nerve impulse. The impulse is carried to the CNS (Central Nervous System) which creates a response, in this case the contract of the arm muscle.

**ACTIVITY 2. Senses and receptors.**

(Page 48 of pupil's textbook book)

Here is the complete table. Pupils may find it easier to write down the second column in their mother tongue.

Sense	Kind of receptor	Why? Or example of how it works
Touch	Thermo receptor and mechanoreceptor	The skin is sensitive to heat or cold and also to pressure
Hearing	Mechanoreceptor	We can hear thanks to small bones in our ear
Balance	Mechanoreceptor	It is also thanks to pressure receptors
Smell	Chemical receptor	Smells are chemicals that dissolve in the humidity of our nose
Taste	Chemical receptor	Taste can recognize chemicals that are dissolved in the humidity of our mouth
Sight	Photoreceptor	Cells in the eyes are sensitive to light (intensity or colour)

**ACTIVITY 3. What does my brain do?**

(Page 50 in pupil's textbook)

Part of the brain	Function. What do I control?
Cerebrum	It controls all voluntary actions
Cerebellum	It controls balance
Medulla	It controls the rate of breathing and heartbeat

Here are the answers to the questions:

1. The **brain** and **spinal cord** make up the **central nervous system (CNS)**.
2. The nerves that connect the CNS to the rest of the body are called the **peripheral nervous system**.
3. The **autonomic nervous system** controls our life support systems that we don't consciously control, like breathing, digesting food, blood circulation, etc.

4. A brain cell can only live without oxygen for 3 to 5 minutes.
5. The **brain and spinal cord** are covered by a tough, translucent membrane, called the **dura matter**. Cerebrospinal fluid (CSF) is a clear, watery liquid that surrounds the brain and spinal cord. Finally the **cranium** (the top of the skull) surrounds and protects the brain. The spinal cord is surrounded by **vertebrae** (hollow spinal bones).
6. No, a nerve cell cannot reproduce.

#### ACTIVITY 4. The three types of muscles.

(Page 55 in pupil's textbook) Here is the complete table.

Type of muscle	Smooth muscle	Cardiac muscle	Skeletal muscle
Appearance	Smooth	Striated	Striated
Voluntary or involuntary	Involuntary	Involuntary	Voluntary
Function	It controls movement of internal organs	It controls contraction of the heart	It moves bones. It works in pairs: when one contracts, the other relaxes. It is attached to bone by bands of tissue called tendons.

#### ACTIVITY 5. Labelling the muscular system.

(Page 55 in pupil's textbook)

In this activity pupils find out the names of most of the muscles of a human body. in order to fill in a diagram,

Give every pupil a copy of the muscular system diagram and ask them to complete it. There are two different diagrams (pages i & ii of the annex-unit 3) so the teacher may choose between them, depending on their pupils, or use both of them in different class sessions, in order to recycle and consolidate the muscular system. To complete this activity, students can look at pages 53 and 56 of their textbook. Teachers can also give every two pupils different pieces of paper with drawings and explanations of the following parts of the muscular system parts:

- Muscles of the head and neck
- Muscles of the trunk
- Muscles of the upper extremity
- Muscles of the lower extremity

These pieces of paper can be found from page iii to vi of the annex (unit 3).

#### ACTIVITY 6. Fast questions and answers.

(Page 55 in pupil's textbook)

This is just a reading activity. Pupils can find the answers quite easily, just reading through the text. Here are the answers to the questions.

- A. The largest muscle in the body is the gluteus maximus muscle in the bottom

- B. The busiest muscles in the body are the eye muscles. Scientists estimate that they move more than 100,000 times a day.
- C. We have over 30 facial muscles that create looks like surprise, happiness, sadness, and frowning.
- D. The two protein filaments we can find in a muscle fibre are myosin and actin; myosin is the thick one and actin is the thin one.

### ACTIVITY 7. Match and copy.

(Page 58 in pupil's textbook) Here is the correct table.

A	B
Compact bone	It is the smooth and very hard part of the bone
Ball and socket joint	It is the joint that allows movement in every direction
Ligament	It is like a rubber band and keeps bones held together at a joint
Joint	It is a flexible connection between bones
Tendon	It is the part of a muscle that is attached to the bone

### ACTIVITY 8. Name that bone.

(Page 58 in pupil's textbook)

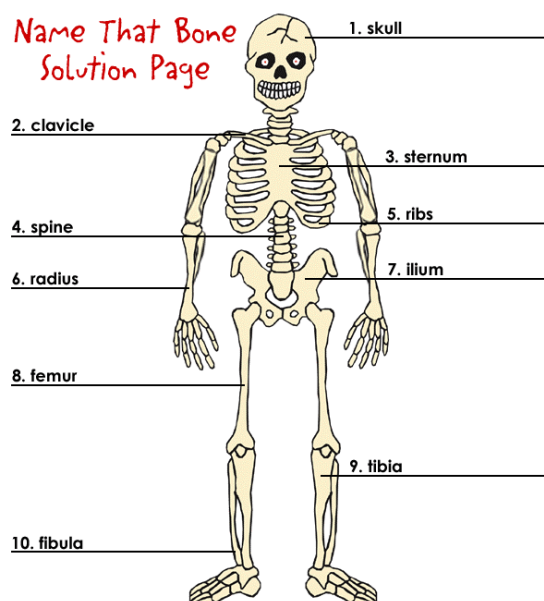
In this activity pupils find out the names of most of the bones of a human body in order to fill in a diagram.

Give every pupil a copy of the skeletal system diagram and ask them to complete it. There are two different diagrams (pages vii & viii of the annex-unit 3) so teacher may choose between them, depending on their pupils, or use both of them in different class sessions, in order to recycle and consolidate the skeletal system. The teacher can also give every two pupils different pieces of paper with drawings and explanations of the following parts of the skeletal system:

- Your spine
- Your ribs
- Your skull
- Your hands
- Your legs
- Taking care of bones

These pieces of paper can be found from page ix to page xiv.

Here is the solution to the diagram.



### Let's look at what we've learnt

(page 59 in pupil's textbook)

Here are the full sentences (words in black are the missing words in the student's copy).

Your **sense organs** detect information from your surroundings. This information is the **stimulus** that triggers (starts) a **nerve impulse**.

The **brain** and **spinal cord** make up the **central nervous system (CNS)**. The nerves that connect the CNS to the rest of the body are called the **peripheral nervous system**. The **autonomic nervous system** controls our life support systems that we don't consciously control, like breathing, digesting food, blood circulation, etc.

The brain has three main parts: the **cerebrum**, the **cerebellum**, and the **medulla** (brain stem). **Neurons** are nerve cells that transmit nerve signals. The **neuron** consists of a **cell body** (or soma) with **dendrites** (signal receivers) and a projection called an **axon**, which conducts the nerve signal. A **synapse** is a gap between the axon terminal of a neuron and the dendrites of the receiving cell.

Muscle is attached to bone by **tendons**. A muscle fibre is made up of millions of tiny protein filaments that work together. Those proteins are called **myosin and actin**.

There are three types of muscles: SKELETAL, SMOOTH, AND CARDIAC. **Skeletal** muscles are responsible for moving parts of the body. **smooth** muscles are usually not under voluntary control. Cardiac muscle controls the contraction of the **heart**.

The skeletal system has two functions; it provides structure and it **protects**.

Bone consists of flexible **protein fibres** and hard **minerals**. The minerals make bone rigid and the fibres make bone flexible.

Joints provide flexible connections between bones. Bones are held together at the joints by **ligaments**.

Our thigh bone is called the **femur** and it is the longest bone in our body. The **ribs-cage** protects our lungs and heart.

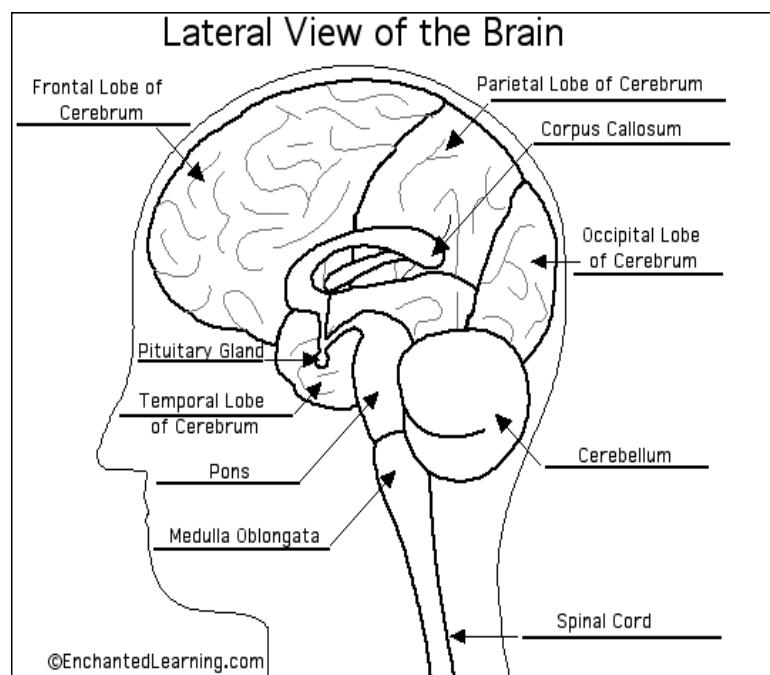
From now on you'll find extra activities and laboratory activities to be used with students in order to consolidate their knowledge about this unit. There are no references to all those activities in the pupil's textbook.

### ***Extra activities***

#### **Label the brain!**

Give each student a copy of the brain (a copy can be found on page xv of the annex-unit 3) and ask them to label and colour it. It is a complex diagram so you can give pupils a copy of page xvi where there are definitions of the different sections of the brain.

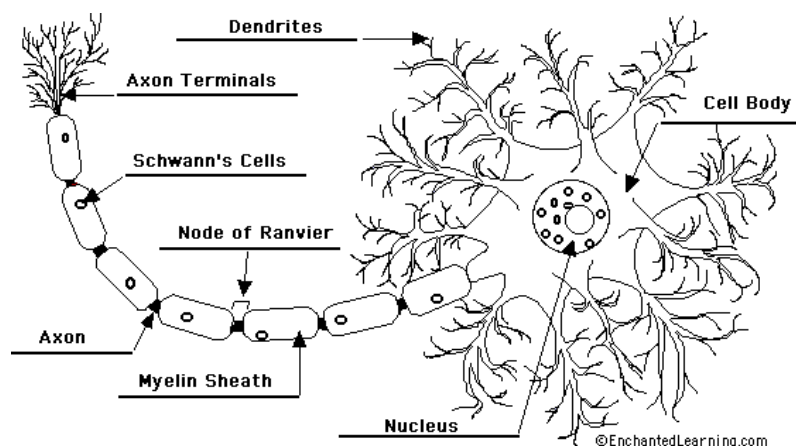
Here is the complete brain diagram.



#### **Label a neuron!**

Give each student a copy the diagram of a neuron (a copy can be found on page xvii of the annex-unit 3) and ask them to label and colour it.

Here is the complete diagram of a neuron.



## Nervous System Summary

This is an advanced activity for fast workers & more-able pupils.

**Procedure:** Give every student a copy of the text with some blanks (can be found on page xviii of the annex-unit 3) and ask them to complete it with words from the box. Once finished teachers may also ask pupils to translate the text into their mother tongue.

Here is the complete text, already corrected:

Messages arriving at the CNS from every part of the body, keep the brain informed of what is going on around it.

There are two main kind of nerves, one carries messages from the sense organs to the CNS, and are called sensory nerves. The other, a motor nerve (Motor = movement) takes nerve impulses to a muscle or gland, which responds in the way that is needed. For example, if you burn your finger, the motor nerve will make you pull your finger out of the flame. This is called a reflex action.

The largest part of the brain, the cerebrum is in 2 halves (hemispheres) the right hemisphere controls the left side of the body, and the left hemisphere controls the right. The cerebrum is responsible for sight, speech, personality, hearing, intelligence...

The medulla controls all unconscious behaviour, such as breathing and heart rates. This is why if you become unconscious you carry on breathing. Excess alcohol can act on the medulla, so your brain forgets to stimulate breathing and you can die.

The cerebellum co-ordinates muscular movements.

## Skeletal and Muscular System Summary

This is an advanced activity for fast workers & more-able pupils.

**Procedure:** Give every student a copy of the text with some blanks which can be found on page xix of the annex-unit 3, and ask them to complete it with words from the box. Once finished teachers may also ask pupils to translate the text into their mother tongue.

Here is the complete text, already corrected:

The main uses of the skeleton are for support, movement and protection of internal organs

Bone, is a mixture of flexible proteins, and hard minerals, mainly calcium phosphate.

Joints are where two bones meet. Bones are held together at the joints by ligaments.

The two main types of joint are hinge e.g. knee and elbow, (allows movement back and forward) & ball and socket e.g. shoulder and hip (allows rotation in most directions).



Muscles work in opposing pairs (antagonistic) so that they can pull in different or opposite directions. One contracts (shortens) while the other relaxes (lengthens).

Tendons attach the muscles to bones.

A muscle fibre is made up two types of protein filaments; thick ones called myosin and thin ones called actin.

There are three types of muscles: skeletal, smooth, and cardiac.

The longest bone in our body is the femur.

### Skeletal system words find

Give each pupil a copy of page xx of the annex (unit 3) and ask them to find the words. It could be a good exercise for slower workers & less able pupils. Here are the answers.

### Maze

Just photocopy the maze that can be found on page xxi of the annex (unit 3) and ask students to find their way to the cell.

### Crosswords

There is a crossword on page xxii of the annex (unit 3). Give each pupil a copy of the sheet and let them complete it. Here are the answers:

Down:

1. Ball and socket
2. Contracts
4. Skeletal
8. Blood cells
10. Distension
11. Muscle
14. Calcium

Across:

3. Cartilage
5. Ligaments
6. Hinge
7. Joint
9. Tendons
12. Phosphorus
13. Radius
15. Cardiac
16. Smooth

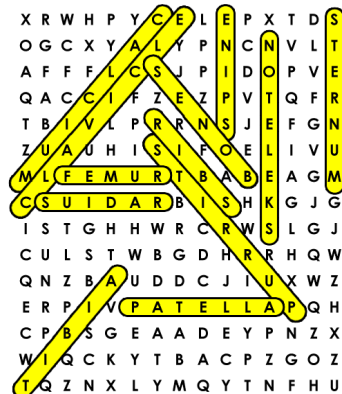
### Brain, Skeletal and Muscular quiz!

**AIM:** To write complete sentences and recap the unit.

**Procedure:** Students write down in their jotter the complete sentences (questions and answers). This quiz is designed to be used with fast workers & more able pupils (Pupils with a high level of English) as questions need full answers. Teachers may also choose to leave students free to answer the questions in their mother language rather than in English. In that case, less able pupils may be able to do it.

#### Skeletal System Word Find Solution Page

Directions: Print out the word find solution page. See how many words you were able to find.



#### WORD BANK

BONES FEMUR RIBS STERNUM  
CALCANIUM PATELLA SKELTON THUMB  
CLAVICLE RADIUS SPINE HIBIA

You can find the quiz, ready to be photocopied on page xxiii of the annex (unit 3). Here are the answers:

1. Sensory nerve cells carry messages from the senses to the CNS.
2. Motor nerves carry signals back to the muscles.
3. The medulla controls the breathing rate
4. The cerebrum controls memory and intelligence.
5. The cerebellum controls balance.
6. The right side of the brain controls the left side of the body.
7. It is a reflex action.
8. The skeleton provides structure and protection.
9. The largest bone is the femur.
10. The rib cage protects the heart and lungs. The rib cage is formed by the ribs, sternum and part of the spinal bone.
11. The skull protects the brain.
12. The elbow and knee are hinge joints.
13. The shoulder and hip are ball and socket joints.
14. Ligaments hold bones together at the joints.
15. Tendons attach muscles to bones.
16. When a muscle contracts it gets shorter. When a muscle contracts the light and dark bands contained in muscle fibres get closer together.
17. When a muscle relaxes it gets longer again.
18. The biceps muscle is found in the arm, above the elbow.
19. The radius and ulna bones are found in the arm after the elbow.
20. The tibia and fibula bones are found in the leg below the knee.
21. One spinal bone is called a vertebra.

### **In touch with the world recap quiz!**

This is a kind of “test” with some short questions about the whole unit, to help pupils recap all they have learnt. Just give pupils a copy of the quiz and ask them to use their jotter to write down the answers. It may be more interesting if pupils write down questions as well. There’s a copy of the quiz on page xxiv of the annex (unit 3).

Here are the answers:

- |                                 |                  |                    |
|---------------------------------|------------------|--------------------|
| 1. Cerebellum                   | 4. Reflex action | 7. Soma (body)     |
| 2. Cerebrum                     | 5. Neurons       | 8. Motor           |
| 3. Peripheral                   | 6. Sensory       | 9. Dendrites; axon |
| 10. Cell body, dendrites & axon | 11. Synapses     |                    |

12. Central nervous system & peripheral nervous system

13. Myelin sheath

14. (See p. 50 Student's book)

15. Neurotransmitters

16. (39) E; (40) B; (41) A; (42) C; (43) B; (44) D; (45) D

17. Myosin

18. Smooth muscles

19. Actin

20. Skeletal muscles

21. Tendons

22. Cardiac muscle

23. Skeletal muscle is responsible for moving parts of the body. Smooth muscle is responsible for involuntary movements. Cardiac muscle is responsible for the contraction of the heart.

24.

membrane covering the outside of bones	Periosteum
connective tissue that connect bones to bones	Ligaments
made up of bones, joints and connective tissue	Skeleton system
connective tissues that connect muscles to bone	Tendons
places where bones meet	Joints

25. Calcium

27. Joint

29. Rib cage

26. Periosteum

28. Ligaments

30. Sternum

31. A) Skeletal muscle; B) Cardiac muscle; C) Smooth muscles; D) Smooth muscle; E) Skeletal muscle; F) Smooth muscle; G) Cardiac muscle; H) Cardiac muscle

32.

a) Skull

f) Humerus

k) Metacarpals

p) Fibula

b) Clavicle

g) Pélvis

l) Phalanges

q) Tarsals

c) Scapula

h) Radius

m) Femur

r) Metatarsals

d) Sternum

i) Ulna

n) Patella

s) Phalanges

e) rib

j) Carpals

o) Tibia

### No doubts!

On pages xxvii & xxviii of the annex (unit 3) there is a wee multiple choice test to help pupils auto evaluate their knowledge.

Here are the answers to the questions in the "no doubts!" test.

1	A	2	B	3	C	4	A	5	A	6	D	7	D	8	C
9	D	10	B	11	C	12	D	13	D	14	A	15	A	16	B
17	B	18	C	19	D	20	A	21	C						

### ***Laboratory activities***

**From page xxix onwards of the annex (unit 3) you'll find some lab activities. They are ready to be photocopied and given to pupils.**

Those laboratory procedures are ready to be photocopied and handed to pupils. You can choose between either asking students to copy the protocol in their jotter, so they won't write on the piece of paper or letting them write on it and then glue it in their jotter.

#### **Lab practice. Knee Jerk Reflex (Patellar Reflex).**

#### **Lab practice. Blink Reflex.**

These two activities are a common demonstration of the mechanics behind reflex actions. The idea is to show how fast a reflex action works, looking and practising a typical reflex action used by doctors to check if the nervous system is healthy.

For this lab activity teachers can choose to either use only the Knee Jerk Reflex and try different ways to change it or add a second, but easier, reflex action: the Blink Reflex.

If the teacher consider it useful, there are other different reflexes to be tried: pupil reflex: opening of the pupil in dim light and closing of it when there is a lot of light.

Show pupils how difficult, or even impossible, it is to try to avoid a reflex action, which means it is involuntary and not learnt.

#### **Lab practice. How Fast are You?**

This activity does not test a simple reflex. Rather, this activity is designed to measure the response time to something you see.

There are two ways of calculating the response time. One is by using the table that compares distance with time (suitable for less-able or slow-workers) and the other where one needs to use some formulae (suitable for more-able & hard-workers).

#### **Lab practice. Test your reaction time.**

This is a computer activity. With 4 different activities pupils will be able to check their reaction time to several stimuli. There is a power point presentation that shows how to enter the web page where all 4 experiments can be found and how they work. If possible, show it to pupils before allowing them to do the experiment so as to make sure they understand what they have to do.

If pupils write down their results of the experiments they make a table with the class results and work on it, for instance, finding out who is the fastest, compare boys versus girls, and so on.



# Final activities

## 20 Little Known Facts About The Human Body

The aim of this activity is to learn something different about the human body as a final activity. At the same time pupils can work in pairs or in groups and develop their creativity.

Teachers can give every group of pupils one or more facts about the human body (see page i of annex in final activities, at the end of unit 3) in order to make them create a mural to show their fact(s) to the rest of the class.

They can draw, write, etc. or anything else to illustrate their facts. Everything will be welcome.

Pupils could also present their final work orally and let the rest of the class evaluate it.

## Sum up activity.

Through this course pupils have looked at:

- ✓ Cells
- ✓ The digestive system
- ✓ The respiratory system
- ✓ The circulatory system
- ✓ Coordination: the nervous system
- ✓ Muscular system
- ✓ Skeleton system

Now it is time to ask students to sum up some of the things they have learnt and, at the same time, ask them to work in groups, be creative and practice their speaking. How?

Just give every group of pupils one of the subjects and make them create a power point presentation about the main things they think they've learnt and later on present it in front of the rest of the class and be ready to answer questions.

## Internet activities.

There are lots of web pages with interactive activities for pupils. There is a power point presentation that shows some of these web pages and gives instructions on how to use them with pupils.